Rural industrialisation, urbanisation and infant mortality in Higham Ferrers, Northamptonshire, 1879-1910 : a vaccination register study

Thesis

Rural Industrialisation, Urbanisation and Infant Mortality in Higham Ferrers, Northamptonshire, 1879 – 1910: a Vaccination Register study

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Abstract

In this study the experience of infants born between 1879 and 1910 is examined to determine whether the urban-rural effect seen in larger, more industrial settings was also present in a small town set in a rural community. The area researched is the Higham Ferrers registration sub-district in Northamptonshire where industrialisation of shoemaking took place from the 1870s with consequent urbanisation of Rushden: the main manufacturing centre. Urbanisation brought with it a surge in population that overwhelmed local resources and caused deterioration of the physical environment.

The central data source used was the hitherto largely unknown smallpox vaccination birth and infant death registers which were available for the Higham Ferrers district sub-district from 1879 to 1910. These, together with a range of contemporaneous local information, provided a rich source of social and biographical information and permitted a rare opportunity to situate the infants within their family context.

The study has explored the well-documented urban-rural differences in infant mortality and shown that these were present in the Higham Ferrers despite the sizes of the parishes involved. The situation was far from straight forward however and the influences on the infant experience were found to be numerous and to have operated in a variety of different but interconnected levels: community, family and individual infant.

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Glossary

Higham Ferrers registration sub-district

Higham Ferrers registration sub-district (Higham Ferrers sub-district / Higham Ferrers / sub-district) consisted of eight parishes: Rushden, Irthlingborough, Higham Ferrers, Farndish, Irchester, Newton Bromswold, Podington and Wymington.

The three largest parishes; Rushden, Irthlingborough and Higham Ferrers were designated as urban following re-organisation of local government in 1894. To distinguish Higham Ferrers and Irthlingborough from Rushden they have been described as 'other urban'.

The town of Higham Ferrers has been denoted as Higham to differentiate it from the sub-district.

Newton Bromswold and Podington have been variously spelt within the smallpox vaccination birth registers and other sources but have been standardised in this study for the purposes of clarity.

The hamlets of Higham Park, Hinwick Podington and Little Irchester have been incorporated in the statistics for their associated places – Higham, Podington and Irchester – respectively as the numbers for each were too small to be examined separately.

Abbreviations

Medical Officer of Health	MOH
Smallpox Vaccination Birth Register	VBR
Infant Death Register	IDR
Combined Vaccination Registers	CVRs
Rushden Urban District Council	RUDC
Census Enumerators Book	CEB
Infant Mortality Rate	IMR
Neonatal Mortality Rate	NMR (1 - 28 days)
Post-neonatal Mortality Rate	P-NMR (29 days – 1 year)
Early Neonatal Mortality Rate	E-NMR (1 – 7 days)
Late Neonatal Mortality Rate	L-NMR (8 – 28 days)

Introduction

"The rate of infant mortality is high especially for a rural district, but it must be borne in mind that in the large villages where the people work in factories, the conditions of life are much what they are in the factory towns where the rate of infant mortality is always high".
J Howell Thomas (1883)

These were the first impressions of Thomas, the Medical Officer of Health for the Wellingborough Rural Sanitary District, when he surveyed Higham Ferrers in 1882 for the first time. Higham Ferrers was one of three registration sub-districts within the Wellingborough District in Northamptonshire and consisted of three small rural towns or large villages and five small villages or hamlets. Compared to the *'factory towns'* that Thomas mentioned, the towns of Higham Ferrers were very small until the early 1870s, when shoemaking within the sub-district, which had previously been a cottage industry, was industrialised. This led to the urbanisation of Rushden, the largest of the parishes, and a rapid growth of its population from 3,657 in 1881 to 12,000 by 1901 (Hall & Harding 1985).

The changes that occurred in Higham Ferrers were typical of those, albeit at an earlier period, in towns and cities throughout England and Wales. During the period from 1750 to 1830 the character of Britain changed irrevocably as a result of the industrial revolution, which led to profound changes in lifestyle for the people. Many moved away from rural agricultural parishes to the burgeoning industrial towns and, according to Williams & Mooney (1994), by the mid-nineteenth century over half of the population of Britain lived in urban settlements. Neither house building nor the legislation regulating it, could keep pace with the redistribution of the population, resulting in overcrowding and poor sanitation. The health of urban communities became a cause for concern with widespread epidemics and high rates of mortality (Woods & Woodward 1984). Life expectancy at birth in the major cities decreased as rates of infant and child mortality rose and according to Williams & Mooney (1994:186), *'national infant mortality was increasingly being driven by the behaviour of the towns and cities'.*

What is not clear, however, is which of the factors within the urban environment were responsible for the high levels of infant mortality. Much of the contemporary literature relating to factors influencing infant death in the 19th century centred initially on the deterioration of the physical environment and then later, on maternal ignorance and poor infant care. The domestic environment and working lifestyles were addressed in the contemporary literature, but generally in relation to the urban mother's ability to breastfeed and to provide adequate care for her infant (Newman 1906). More recent studies have examined the urban penalty experienced by infants, (Williams & Galley 1995; Sheard and Power 2000). Others have explored the impact of industrialisation and maternal occupations on infant mortality rates within a range of different industrial settings e.g. rural (King 1997), textile towns (Garrett 1990), the potteries (Holdsworth 1997) and mining settlements (Reid 2002).

This study, which is part of a larger project related to the decline in infant mortality, under the direction of Professor Michael Drake of the Open University (OU) and part funded by the Wellcome Trust, aims to determine the impact, if any, of the industrialisation of shoemaking and the consequent urbanisation of Rushden on the experience of infants born during the period 1879 – 1910 in the Higham Ferrers sub-district of Northamptonshire. The

study has been conducted at the lowest level possible; that of the individual infant. Many previous studies have used a large bank of data aggregated at national, county or district level from which to make inferences, but several authors have suggested that an examination at the local level is needed to determine the role played by any, or all of the potential contributing factors to infant mortality patterns (Garrett & Reid 1995; Williams & Galley 1995).
Examination at this level has been made possible by the availability of the hitherto largely unused smallpox vaccination birth and infant death registers. These are accessible for the Higham Ferrers from 1879 to 1910 and provide a rich source of social and biographical information relating to the infants born in the sub-district during this period. Although the registers have their faults, they enable the differences between socio-economic groups to be distinguished, especially that between shoemakers and non-shoemakers. Actual dates of birth and death are included thereby facilitating exploration of age specific infant mortality and also afford the opportunity to accurately determine the seasonality of infant birth and death. When used in conjunction with the CEBs for the period, it is also possible to locate the infant within its family context. The registers were produced in the late 19th century and early 20th, as part of the administration set up to ensure compliance with laws making vaccination against smallpox compulsory, but unfortunately few have survived.

The first part of this study provides contextual information for the second part, in which the experience of all infants born in the sub-district between 1880 and 1889 are explored. Industrialisation took place in Higham Ferrers up to a century later than in other major manufacturing centres and after the great Public Health Acts of the 19th century. These Acts, according to Szreter (1994), were responsible for the decline in infant mortality that occurred during the last quarter of the century and are explored in Chapter 1. In addition a review of contemporary literature on infant mortality provides the academic context for the study.

In Chapter 2, the history and impact of the industrialisation of shoemaking within the sub-district is examined. Sources and methods are analysed in Chapter 3 and then, in Chapters 4 and 5, infant and neonatal mortality within the sub-district during the period 1879 – 1909 are set in the context of national, county and district rates. As the registers provide actual dates of infant birth and death, the impact of influences at various periods during infancy can be explored; an important benefit because differences between the neonatal experience and that of the post-neonate is inevitably obscured when only overall infant mortality rates are used.

Part 2 of the study takes a more individual approach, by using census information to build upon the data from the smallpox vaccination registers. The environmental and social changes in the sub-district and the pattern of infant mortality during the years from 1880 – 1889 are examined in Chapter 6. This relatively short time period has limited the numbers of infants involved in the study and therefore the opportunity to provide robust statistical analysis. This was however a period for which both vaccination birth and infant death registers were available and it was therefore possible to research not only the mortality experience of infants, but also to set the individual infant in the context of its family. It was also an exceptional period in the history of shoemaking and urbanisation in Rushden with an increase of 103% in the population in 10 years.

Bell & Millward (1998:221) indicate that the study of infant mortality "*ultimately depends upon efforts to disaggregate and measure the influences of different factors involved*". To this end, three issues thought to be influential for the infant experience in Higham Ferrers, are examined in depth in Chapters 7, 8 and 9: namely the impact of the environment-

community and domestic, the influences of maternal factors such as maternal age and occupation and lastly the characteristics of the families within which infants were born and died.

The thesis concludes with a discussion of the findings and a summary of those key points, which contribute to the debate on infant mortality in general and the influences of the shoe industry on the infant experience in particular.

Chapter 1 Public Health and Infant Mortality, 1879-1910

Infant mortality came to the forefront of medical and government attention in the late 19th century, at a time when both fertility and overall mortality rates were falling (Newman 1906). In his book '*Infant mortality: a social problem*' George Newman, the Medical Officer of Health (MOH) for Finsbury wrote that "*whilst during the last half century, a time of marvellous growth of science and of preventive medicine, human life has been saved and prolonged and death made more remote for the general population, infants still die every year much as they did in former times. Indeed in many places it appears that they die in greater numbers and more readily than they did in the past*' (Newman 1906:2). For those infants who survived to their first birthday, the impact of disease left them weakened and vulnerable to further disease processes, with consequent devastating effects on the health of the population, as exemplified by the report in 1904 of the Interdepartmental Committee on the '*Physical deterioration of the labouring poor*' (Watkin 1975).

Many theories have been advanced to explain the poor health of infants, but urban living was seen to be a major factor. Within towns and cities a combination of factors such as increased population density, insufficient housing and ineffective sanitation, resulted in a deterioration of the physical environment, both domestic and public (Sheard & Power 2000). In-migration and improved transport networks increased the disease pool and overcrowding and poor sanitation facilitated the spread of the so-called '*filth diseases*'. As Woods indicated, "*the physical and social environments in which Victorians lived clearly had important influences on morbidity and the likelihood of early death*" (Woods & Woodward 1984:25). The impact of urbanisation on the infant experience has been explored from many angles, but few would disagree that an urban penalty existed and that those infants born into rural areas experienced lower rates of mortality than their urban counterparts (Woods et al 1988). What is not so clear however, was which of the pernicious factors within the urban environment led to high levels of infant death, and therefore whether all infants living in the same urban setting were subject to an equivalent level of risk (Watterson 1986).

In this chapter the contemporary literature relating to infant mortality and perceptions of the causes of infant death will be explored. The 'urban effect' apparent in the pattern of infant mortality in the last decades of the 19th century, will be reviewed to set in context the ensuing discussion of infant mortality in the Higham Ferrers sub-district during the period of the study from 1879 to 1910.

1:1 Mortality statistics

A major factor in any meaningful exploration of mortality rates is that of valid vital statistics. In 1836 the General Register Office (GRO), responsible for the civil registration of births, marriages and deaths, was set up in London by Act of Parliament and a Registrar General (Thomas Henry Lister) appointed. The data provided was of great value in exploring mortality, although as Higgs (2004) indicates, the main aim of the registration system; that of *'protecting the rights and obligations respecting property across the generations'*, was more fundamental to the origins of the GRO and civil registration than to the generation of statistics (Higgs 2004:17). The GRO also took on the organisation of the census, which was then transformed, providing more accurate information on the

composition of the population (Higgs 2004).[1] From 1839, an analysis of birth and death registration, demographic and medical data was published in the form of an Annual Report by the GRO. Initially the reports were in two sections - the first, the report of the Registrar General and the second, a report or letter to the Registrar General from the Superintendent of Statistics (initially William Farr), which usually took the form of mortality tables. After 1879, the latter report was incorporated in the Annual Report itself, to reappear as a separate entity in 1901 when it became known as the '*Review of Vital Statistics*' (Higgs 2004).

Although the registration of deaths provided data to identify patterns and rates of mortality, the initial lack of standard nomenclature made analysis of the cause of death difficult. This situation was highlighted at the first international statistical conference in Brussels in 1853 and as a result, an international classification of diseases was drawn up. The list reduced the thousands of possible diagnoses to 200 in order to allow for meaningful comparison. For the same reason '*The Nomenclature of Diseases*' was drawn up in 1869 in England and Wales by a committee appointed by the Royal College of Physicians, for use by doctors registering deaths. The list has since been revised on many occasions but once instituted made discussion on the causes of death viable (Singer & Underwood 1962). Carter (1997:196) indicates however that causes of death information needs to be viewed with caution as "*the causes we recognise depend on our motives and our scheme for classifying*". Risse (1997) further suggests that although notions of sickness and its causality were the result of numerous ideas and observations, interpretation was subject to political ideologies and economic agendas. Certainly during the second half of the 19th century, as the full extent of the deterioration of the environment became clear, the sanitarians were in the ascendance, with the system of local government fashioned around the issues of public health (Hennock 2000). Despite these reservations the measures instituted provided a much improved account of mortality, but morbidity especially that related to infection remained a problem (Higgs 2004). The Annual Report of the Register General and reports from the Medical Officers of Health (MOH) did much to highlight the environmental situation and the factors impacting on the health (or ill health) of the population, but MOHs frequently complained of a lack of information relating to infectious diseases in their area. As a result, the 1889 Infectious Diseases (Notification) Act, made notification of infectious diseases compulsory, but only in London: a further Act in 1899 enforced notification throughout England and Wales. The GRO began publishing figures of notification of certain diseases in London from 1895, but it was not until 1922 that information was available for the country as a whole (Higgs 2004). Information about infectious epidemics and other diseases was however frequently recorded by MOHs in their Annual reports before the 1899 Act and many MOHs voluntarily introduced the notification of infectious diseases regulations (Galley 2004).

Despite the fact that infant mortality had been identified as a problem throughout the 19th century, comprehensive infant death data was not available until 1857, when the number of deaths under one year was provided as standard for the whole country. The Registrar General's Annual Reports had given details of age at death from 1841, but only for three large cities (Armstrong 1986). The introduction of the infant mortality rate (IMR) as a separate index was used for the first time in the Registrar General's detailed Annual Report

[1] The first population census in Britain took place in 1801 and apart from that in 1941, has been repeated every ten years since (Mills 1984). The first 4 censuses were little more than head counts carried out by the parish authorities and were often incomplete and/or inaccurate, but from 1841 to the present day were conducted by a specially set up organisation and therefore provided a more accurate reflection of the population (Rhind 1983).

in 1877.[2] The rate was said in the report to have been 158 infant deaths per 1000 live births. The fact that no calculation of infant mortality had taken place earlier, even though the data was available, was possibly due to the way in which the infant was perceived by contemporaries. The underlying reasons for this were complex, but in general the death of an infant was seen as a 'normal' biological hazard and little attention was given to it (Armstrong 1986). According to Armstrong, the introduction of the infant mortality rate signalled a change in thinking in relation to the infant; indicating both a medical awareness of the large number of infants dying before their first birthday and a social awareness of the infant '*as a discrete entity*' (Armstrong 1986:212). There was a concurrent interest in the health and welfare of babies and an increasing belief that infant mortality was a predictor of the health of a community or nation. This was exemplified by the Registrar General in 1905 who noted "*Special interest* [is] *attached to the incidence of mortality in the earlier years of life because the mortality at that age is recognised as the most sensitive test of the health of communities*" (HMSO 1905: xliii cited in Armstrong 1986:214). This concept remains and to a large extent accounts for the attention paid to the issue of infant mortality during the 20th century.

The official recording of stillbirths did not occur until 1927 because, according to Higgs, the original aim of registration was '*to record the natality of legal persons*' (Higgs 2004:9). Mooney (1994) suggested that the lack of stillbirth data impacted on overall mortality and infant death statistics – an issue first raised by the 1893 Select Committee on *Death Certification.* The law as it stood in 1893 '*facilitated numerous opportunities for the concealment of crime*', because unlike death at other ages, infants who were stillborn could be buried with the declaration of a *'qualified informant'* - a definition that was open to interpretation (Mooney 1994:43). The belief of the Committee was that the use of the stillbirth legislation to conceal infanticide, especially of illegitimate infants, was widespread and a change in the law was required to address the situation. The Select Committee commented *'In the case of illegitimate children the fact that a still-birth has not to be registered, coupled with the desire for secrecy, is an inducement to a certain class of midwives to ensure that the child be still-born'* (Second Report Paragraph 86 cited in Mooney 1994:43).

1:2 Public Health and mortality

Reports from Medical Officers of Health and the statistics from the GRO during the 19th century, clearly indicated the prominence of urban patterns of disease and the disparity in life expectancy between urban and rural areas (Hardy 2001). The fear of infectious epidemics, especially those associated with contaminated water supplies and ineffective sanitary measures, was widespread. Increased understanding of the epidemiology and the awareness of the association between the environment and disease, led to the development of the sanitary movement and public health reforms (Hardy 1993).

The first significant Public Health Act was passed in 1848, in response to the threat of a further cholera epidemic and to Edwin Chadwick's report in 1842 on the sanitary conditions of the labouring poor (Watkin 1975). This report had shown that "*insanitary living conditions, defective drainage, inadequate water supply and overcrowding were invariably associated with disease, high mortality rates and low expectations of life; that the economic cost of ill-health – computed by such means as taking into account the cost of*

[2] Infant mortality rate (IMR) which was defined as the number of infant deaths under one year per 1000 live births, was first introduced by William Farr in the 2nd report of the Registrar General in 1840. He identified it as being the best way to measure mortality of children less than 1 year of age (Singer & Underwood 1962).

maintaining widows and orphans – was impressive, but that the damage to the fabric of society went far beyond what could be measured in financial terms; that existing authorities and legislation were quite inadequate for the purpose of improving sanitary conditions and health of the population: and that both reform of the law and the setting up of adequate administrative machinery were called for" (cited in Watkin 1975:36). As Chadwick was an administrator not a medic, he focused attention on the financial implications of poor public health and on the drainage and water systems, making health very much the remit of the engineer rather than the doctor. The report, not surprisingly, was received with reluctance by the medical profession. Nonetheless the overwhelming evidence provided by Chadwick together with other reports of *The Health of Towns Association* in 1844 and 1845, resulted in the introduction in 1848 of the first Public Health Act (Watkin 1975).

The 1848 Act provided for a General Board of Health to be set up with responsibility for control of the environment and other public health measures (although according to Watkin (1975), the appointment of a doctor to the Board was an afterthought). In addition there was also provision for the introduction of Local Boards of Health. These Boards could appoint a Medical Officer of Health (MOH) to assist, if they wished, but although the General Board pushed for full-time compulsory appointments, many Local Boards chose not to appoint or only instituted part-time temporary posts during epidemics (Watkin 1975). The General Board was eventually disbanded in 1858 with the Privy Council taking over its functions until the introduction of the Local Government Board. Dr John Simon, the MOH to the General Board was reappointed by the Privy Council and *"saw his function... in the spreading of scientific knowledge which would create an educated local patriotism* (Higgs 2004:82). According to Higgs, Simon believed that local opinion, supported by the work of local MOHs, would force the local authorities to undertake sanitary reform. From 1858, Simon arranged for the General Register Office (GRO) to notify him of local epidemics and supply quarterly figures of vaccination. He also instigated the provision of the first decennial supplement from the GRO for the years 1851 – 1860.

The work of the Local Government Board was mapped out in the 1872 Public Health Act, under which the country was divided into sanitary authorities, each with a Medical Officer of Health (Baly 1995). The MOHs were required to publish annual and quarterly reports, which became a valuable source of ammunition in the battle for public health. The reports were also a rich source of local information giving many local details about causation of disease and the incidence not only of death, but also of morbidity (Galley 2004). Across the country they reported water from wells and rivers contaminated by human excrement; ineffective drainage schemes; cesspits that were not emptied and privies whose contents overflowed into houses. Together with overcrowding, which assisted the spread of airborne diseases, these conditions were seen to encourage death and disease (Baly 1995).

The 1848 Act was the beginning of the acceptance at government level of responsibility for the health of the people and as such, marked the start of the Public Health movement. It was followed by numerous other Acts culminating in the 1875 Public Health Act, which consolidated the provisions of the previous 27 years; providing a complete statement of the powers and responsibilities of local authorities in relation to the public health of the nation (Baly 1995). Successful control of infection and disease was seen to be through control of the environment, with the individual viewed as a recipient of benefits not as an active partner in achieving them.

The Sanitary Authorities were given responsibility for ensuring the removal of human waste, the provision of a safe water supply, and the introduction of effective drainage systems. There were also provisions made to limit overcrowding, deal with infected bedding and set up hospitals for infectious diseases especially smallpox. Infections such as tuberculosis and measles had to be notified and powers were given to local authorities to inspect and dispose of infected food. Under the 1899 Dairies, Cowsheds and Milkshops Order of the Local Boards, dairies, milk-shops and cattle were examined on a quarterly basis.

In general, mortality rates started to decline from the 1870s. This has been largely attributed to the decline in mortality from infectious diseases, but the factors involved are not easily identified (Hardy 2001). Demographers, historians and medics have engaged in a number of inconclusive debates about the cause of mortality decline. Szreter (1988) argued that "*the decline in mortality, which began to be noticeable in the national aggregate statistics in the 1870s, was due more to the eventual successes of the politically and ideologically negotiated movement for public health than to any other positively identifiable factor*" (Szreter 1988:26). Not all would agree however and although nutritional improvements, medical or paramedical intervention, and the contribution to public health through state and local government initiatives have all been espoused by theorists, it would seem that no single factor has been conclusively identified as being elemental in limiting the mortality brought about by infections (McKeown 1979; Williams & Galley 1995; Millward & Bell 2001).

McKeown (1979) identified four main categories of causes of death; airborne infections, water and food borne infections, infections other than these and non-infective conditions. Of the four categories McKeown concluded that in the period 1848 to 1971, the reduction in airborne infections contributed 40% to the decline in overall mortality rate; with a 30% reduction before 1901. He assessed the contribution of the other categories to the decline to be: water and food borne 21 %, other infective conditions 13% and non-infective conditions 26 %. For mortality from infection to be eradicated, McKeown (1979) suggested that the main factors would probably have to be a reduction in the spread or virulence of an infecting organism or changes in the resistance of the host. He indicates however, that there is little evidence to support the argument for a reduction in virulence of infecting organisms: the exception being scarlet fever.

In his evaluation of influential factors in the decline of mortality from infections, McKeown (1979) ruled out improved medical treatment and public health measures. He rightly indicated that the decline preceded the introduction of therapeutic treatment for most infections, except smallpox. McKeown also considered that the contribution of public health measures, such as improved sanitation and the supply of clean water, was limited because infectious epidemics remained common long after the decline in mortality. He does however concede that typhoid and related diseases generally disappeared following the introduction of a clean water supply and safe methods of dealing with waste (McKeown 1979). However, McKeown makes no mention of non-clinical activities such as health promotion, counselling and the giving of advice, all of which may well have contributed to the decline in mortality from infections. Instead he theorised that improved resistance of the host was the most influential factor in the decline in mortality and that this came about through a better standard of living and in particular a better standard of nutrition.

Certainly the case for nutrition has many supporters. Winter (1982) for one, indicates that

improved nutrition was the most significant factor in decreasing mortality rates, by increasing the resistance to infection; whilst sanitary improvements lessened the risk of exposure. Critics however cite the fact that living standards increased with industrialisation much earlier in the century, and certainly before there was any evidence of a fall in mortality rates (Szreter 1988). Szreter suggests that the major factor in the decline was the improvement in the physical environment, both on a macro and a domestic basis. He argues that McKeown reached his conclusions through a process of elimination, resulting in a less rigorous evaluation of the role played by nutrition than of other factors (Szreter 1988).
Whatever the truth of the matter, there is no doubt that mortality rates declined rapidly during the latter part of the 19th century. Although McKeown's thesis began a long-standing discussion on mortality decline and the contributory factors, he made no mention of the fact that the pattern of mortality was not uniform. Nor did he focus to any great extent on child and infant death, even though rates of infant mortality remained persistently high in the towns at the end of the 19th century.

1:3 Infant Mortality

It was not until the last two decades of the 19th century that the secular decline in infant mortality began throughout most of Western Europe. Although the patterns that emerged in different countries varied, according to Woods et al (1988), there was a remarkably consistent acceleration of the rate of decline from 1900, regardless of when it had begun. The fact that this pattern was different from that seen for mortality at other ages, including that for 2 – 4 year old children, suggests that the factors influencing the decline in infant death may have been different from those influencing the population in general (Woods et al 1988).

Concern for infant welfare had been expressed as early as 1817 by Dr John Burrell Davies, who published a pamphlet in which he attributed the high infant mortality rate to the lack of proper maternal care (Clark 1978). The debate was further enhanced by comments in the Registrar General's annual reports and in the reports of Medical Officers up and down the country that exhorted mothers to improve the standard of childcare and in particular infant feeding. In the mid-19th century Sir John Simon, Medical Officer for the Privy Council, observed that there were two reasons for high rates of infant death – firstly, unsanitary housing conditions and secondly, neglect by mothers working outside the home (Woods et al 1989).

With the advent of reliable measures of infant mortality from 1877, what became apparent was the 'urban effect' or the difference in infant mortality rates between those infants who were born in urban areas compared with rural settings (Williams & Galley 1995). The persistently high level of infant deaths in the major towns and cities during the late 1890s was a cause for alarm, indicating deficiencies in public and private environments and reflecting an increasing belief that infant mortality was a predictor of the health of a community or nation (Huck 1997; Woods & Shelton 1997). In 1859, Dr William Farr, the Compiler of Abstracts and later Statistical Superintendent at the General Register Office, had demonstrated a difference in the causation of infant death according to geographical location. He indicated that there were both healthy and unhealthy registration districts and that the difference between them lay in the quality of the urban environment. According to Farr, the rate of infant mortality could be reduced in the unhealthy areas by improvements in sanitary conditions whereas that in the healthy areas was said to be '*largely irreducible*' (cited in Galley & Woods 1999:36). A view supported by William Ogle, the Statistical Superintendent at the General Register Office, who used infant death certificates for the

period from 1889 – 1891 for three rural districts with low infant mortality rates and three towns to examine the 'urban effect' in infant mortality. (Galley & Woods 1999) (Table 1:1).

Diarrhoeal diseases were particularly evident in the urban setting and were seen to be responsible for an IMR of 40:1000 according to Ogle, whereas in the rural areas the IMR remained very low at 5:1000 live births (cited in Galley & Woods 1999). The difference in neonatal mortality rate (NMR) for diarrhoea between the urban and the rural parishes was also marked, with that in the towns being 19:1000 compared to 0.4:1000 in the rural areas. Neonatal death in the rural areas was seen to be predominantly brought about by premature birth often associated with atrophy and congenital malformations. In the towns however, high rates of neonatal mortality resulted from diarrhoeal diseases, atalectasis and convulsions (Table 1.1).

Table 1:1 *Comparison of cause of death in infancy in three towns (Blackburn, Leicester and Preston) and three rural registration districts (Dorset, Hertfordshire and Wiltshire) 1889 – 1891*

Cause of Infant death	**Urban NMR[1]**	**Rural NMR**	**Urban IMR[2]**	**Rural IMR**
Congenital malformations	1.75	1.57	2.34	2.28
Diseases of the respiratory organs	1.89	1.68	37.01	21.05
Whooping cough	0.1	0.17	6.94	4.16
Atrophy	8.62	9.68	27.34	17.38
Premature Birth	20.54	12.67	22.79	13.81
Convulsions and other diseases of the nervous system	9.01	4.44	37.76	13.81
Diarrhoeal diseases	1.89	0.39	39.61	4.81
Atalectasis	1.41	0.45	1.49	0.55
All Causes	**49.47**	**34.88**	**218.03**	**97.17**

[1] NMR = Neonatal Mortality Rate – the number of neonatal deaths (deaths under 1 month) per 1000 live births
[2] IMR = Infant Mortality Rate – the number of infant deaths (deaths under 1 year) per 1000 live births

Source: Adapted from Registrar General's 54th Annual Report for 1891 Tables D and E (1891:xix-xv) cited in Galley & Woods (1999:40 – 41)

As indicated previously, the definitions used were problematic and make it difficult at this remove to determine actual cause of death, since, for example, in some situations whooping cough may have been classified as a disease of the respiratory system, or atrophy included under the heading of premature birth.

Unlike other commentators Brend (1917:32) separated out the causative influences in infant death, not by geographical location, but by the nature of the disease, although the outcome was the same. He wrote, *"under the term 'infant mortality' we are classing together two radically different types of death, which are brought about by different influences"*. According to Brend there were those diseases, which *"varied little from year to year and class to class"* and others that consisted of *"deaths mainly due to respiratory diseases and enteritis caused by influences in the post-natal environment"*. These he said were diseases of urbanisation and were probably *"entirely preventable"* (Brend 1917:32 cited in Galley & Woods 1999:37).

Subsequently these categories of disease causation have been grouped into endogenous

(those associated with congenital defects and trauma of birth) and exogenous factors (those attributable to the post-natal environment) (Galley & Woods 1999). Bourgeois-Pichat (1952) highlighted the difference in age at death in infancy between exogenous and endogenous factors and indicated that whilst causes of death for the infant aged 1 – 11 months were almost entirely exogenous in origin, those for the neonate during the first month of life was seen to be both endogenous and exogenous (cited in Galley & Woods 1999).[3]

In 1906, Newman had concluded that diseases of infancy resulted from an inter-related set of conditions; that nearly half of infant deaths occurred in the first 3 months (48%); that these were mainly due to prematurity and associated diseases; that epidemic diarrhoea was a major cause of death for the infant in the post-neonatal period and finally that during the second half of the 19th century, whilst some diseases were declining, the rates of the first three (prematurity, diarrhoea and pneumonia) were steadily increasing (Newman 1906).

According to Newman, respiratory diseases, such as pneumonia and bronchitis, were largely urban diseases, with urban rates of infant death from pneumonia usually 80% in excess of those seen in rural areas (Newman 1906). Similarly, although the causes of diarrhoea were many and varied, epidemic diarrhoea, attributed to long hot dry summers particularly at the end of the 19th century, was said by Newman to be "*aggravated by bad housing conditions, poverty, artificial feeding and domestic insanitation*" (Newman 1906:48). Although Williams & Galley (1995) agreed that epidemic summer diarrhoea was an urban phenomenon, they theorised that it was the inability of communities to overcome the short-term fluctuations in the weather that acted as a barrier to the decline in infant mortality, rather than urbanisation per se. However whilst rates of epidemic diarrhoea were lower in rural areas, Newman also found that the incidence in 1903 was rising at the same rate as in the towns.

The view that exogenous causes were more prevalent in urban settings and could be prevented, lent support to the sanitarian movement's aim to improve the physical environment. However, as infant mortality rates remained high despite the decline in rates at all other ages, the social aspects of infant death became a more prominent issue for discussion. Much of the contemporary literature on infant mortality related not so much to the cause of death itself, but more to the factors influencing it, especially those related to the quality of maternal care. For example, whilst urban management, especially public health initiatives, was seen by some to be the key to improving mortality rates in general, in the case of infant death, attention was also focused on domestic management (Sheard & Power 2000).

The 1904 report from an Interdepartmental Committee on Physical Deterioration further highlighted the main issues and indicated clearly that the responsibility for infant welfare and indirectly for infant mortality should be attributed to the mother. The report was commissioned when it was discovered how poor the physical condition of recruits to the army for the Boer war was. Mothers were blamed, not only for high mortality amongst infants, but also for the pitiful state of their offspring arriving at recruitment offices of the armed forces, and were urged to produce the kind of sons that the country required. As an

[3] This contrasts with the information in Table 1.1 which identifies premature birth as a cause of death for the post neonate. However as IMR includes those infants dying in the first month as well as the post-neonatal infant, it is not possible from Ogle's data to identify conclusively when deaths from premature births occurred.

example, Walker-Smith (1998:349) cites one such report in the BMJ in 1903 which stated *"now, and more than at any time in the history of the British people do we require stalwart sons to people colonies and to uphold the prestige of the nation".*

As with previous reports, the role of the mother was described by Newman as being a major factor in the infant experience. In his preface he says that *"...a high death rate of infants is an indication of the existence of evil conditions in the homes of the people – which are after all the vitals of the nation. Poverty is not alone responsible, for in many poor communities infant mortality is low. Housing and external environment alone do not cause it, for under the worst external conditions in the world the evil is absent. It is difficult to escape the conclusion that this loss of infant life is in some way intimately related to the social life of the people"* Newman (1906:vi).

Newman attributes epidemic diarrhoea, (the major factor, he suggested, in the causation of death of the older infant), to poor domestic hygiene, because as he indicates, the problem cannot lie with the external environment, which had *"improved enormously"* over the previous 25 years. Expressing his support for the views of the Report of the Interdepartmental Committee on Physical Deterioration, he cites from the report that *"laziness, want of thrift, ignorance of household management and particularly choice and preparation of food, filth, indifference to parental obligations and drunkenness - which largely infected adults of both sexes - press with terrible severity upon their children"* Newman (1906:220).

Sir Arthur Newsholme, a Medical Officer for Brighton and then Chief Medical Officer for the Local Government Board at the turn of the century, also indicated the influences on infant mortality from his perspective in various reports, especially that of 1910. In common with previous commentators, he attributed infant deaths to improper maternal care of the infant and insanitary domestic conditions. However, he also cited maternal health and well being as being prominent issues – especially antenatal care and care at the time of delivery. The issues he raised were summarised by Woods et al (1988:114) and are laid out in Table 1:2.

Table 1:2 A summary of the factors influencing infant mortality rates, proposed by *Sir Arthur Newsholme (Taken from Reports in 1910, 1913, 1914, 1915 and 1916)*

A. Mother	B. Care of Mother	C. Care of Child	D. Poverty	E. Housing	F. Sanitation	G. Personal factors
Age	Ante natal	Delivery	Housing	Type	Pure water	
Work	Post natal	Visiting (care and advice)	Un-employment	Over-crowding	Excreta disposal	
Family size	Maternal mortality	Feeding Breast	Wife's work		Scavenging	
Illegitimacy		Artificial form of preparation	Other children's work		Paving	

Taken from Woods, Watterson & Woodward (1989:114).

The main factors therefore seen by Newsholme, to influence the infant experience were identified as relating first and foremost to the role of the mother. Responsible motherhood

was seen as the antidote to high infant mortality, especially among the urban working class. Blame was not placed on the working or living conditions generated by poverty but placed squarely on the ignorance of mothers. Factors such as the impact of urban living, weather conditions, sanitation, contaminated water and milk supplies were all seen to relate to infant death through the mother's lack of ability to overcome them

Secondly, there was common agreement that maternal health and welfare at the time of delivery were crucial to the survival of the neonate. Again, however, the mother was found to be wanting and Newman blamed her for her poor physical health, which often led her to deliver a premature or immature infant. He concludes that "*in spite of the tendency of nature on behalf of the newborn child, poor physique and ill-nutrition of the mother exerts in a considerable percentage of cases an injurious effect upon the infant*" Newman (1906:89).

Newman, Newsholme and the Interdepartmental Committee on Physical Deterioration, not only commented on the causes of infant mortality, but also made wide reaching recommendations, which were both visionary and paternalistic (Baly 1995). The recommendations related to areas where there was a general consensus that improvements would benefit the urban infant and would lead to a decline in the high infant death rate, especially that of the older infant dying from epidemic diarrhoea: the scourge of industrial towns. The main areas covered included:

1. Education of mothers
2. Improvement in sanitation and water supply
3. Provision of clean uninfected milk supply

The need to address the issue of maternal ignorance was seen as essential, as it represented the main influence on infant welfare. Mothers were thought to have a responsibility for rearing a physically and mentally healthy population: a view underlined in many reports at the time especially the report of the Interdepartmental Committee on Physical Deterioration (Walker-Smith 1998). The way in which the mother managed her domestic affairs became a matter for state intervention as she was '*bringing up her children on behalf of the nation*' (Abbott and Wallace 1990:27). Intervention took the form of home visiting on an individual basis to monitor both the home environment and infant care, and where these were found to be deficient, to educate to a 'norm' measured against middle class values. These schemes had their origin in the public health movement and were initially related to sanitary measures, but by the turn of the century concerns about public health were translated into individualistic, preventative medicine focused on the working class mother (Abbott and Wallace 1990). They also provided a focus for the philanthropic, middle class educated female (Dingwall et al 1988). One early scheme was that of the Manchester and Salford Sanitary Association, which was formed in 1852 following the introduction of the 1848 Public Health Act (Marland 1993). The association aimed to teach the laws of health through lectures and the issuing of pamphlets. Initially it was designed to instruct working men at their place of work, but when this failed, the organisers turned to the domestic setting. In 1861 the Association was extended to women and the Ladies Sanitary Association was formed. Education was given by 'mission women' who were usually ordinary working women who lived in the same districts, were given a small wage and some education. They were partnered with a 'Lady Supervisor', a volunteer drawn from the middle classes, who exercised control over a district. This practice eventually resulted in the foundation of Health Visiting. Due in part, however, to the shortage of Lady Visitors widespread introduction did not occur until the beginning of the 20th century (Dingwall et al 1988, Marland 1993).

The impact of such visiting schemes on infant mortality is far from clear (Drake 2006; Galley 2006). Education largely revolved around the issues of infant feeding practices and therefore the results of the visiting programme tend to be confused by the issues surrounding breast-feeding. If women were not breast-feeding then education could be seen to be important, but the evidence seems limited. Newman (1906), in defence of the need for maternal education, argued that especially in urban areas, mothers were '*victims of industrialisation*' and had become '*deskilled*' and '*lost the skill to feed their infants naturally*' (cited in Walker-Smith 1998:353). However, the 1913 report on Infant Mortality indicated that two thirds of working class babies were breast fed up to the age of 6 months for economic reasons, and always had been. If this is true, then this to some extent contradicts Newman's assertion that the mother had lost the skill to breast-feed. An extension of the argument made by Dr Jones, was that it was not necessarily maternal ignorance that created the problem but the quality of the carer used by working mothers. Jones commented in 1894 "*The children of women engaged in industrial occupations suffer from the effects of maternal neglect. They are handicapped from the moment of birth in their struggle for existence, and have to contend not only with the inevitable perils of infancy but also against perils due to their neglect by their mothers and to the ignorance of those to whose care they are entrusted.*' (Jones 1894:56, cited by Garrett and Reid 1995:85).

The effectiveness of the education given by the visitors has also been questioned at times. In the Huddersfield experiment for example, the mortality rate of infants remained the same after intensive visiting. The explanation - an outbreak of summer diarrhoea, seems contradictory since this was the very issue that led to the introduction of visiting in the first place (Marland 1993). In contrast G. M. Nolan found a decrease in infant mortality in Derby, resulting from better feeding practices promoted by health visitors (Szreter 1988).

Newman (1906) noted that the breast-fed neonate would generally be exempt from the infection, but the non breast-fed child or the older infant, once weaning had taken place, would be as susceptible as other members of a community to infections carried by food and water. According to Newman (1906:139) 75% of all deaths from epidemic diarrhoea occurred in the infant under one year of age and about 78% of these occurred in towns. Quoting Newsholme's findings he indicates that diarrhoea was most prevalent in towns without a pure water supply or means to effectively remove human waste (Newman 1906:151). Williams and Galley (1995) conclude in their study, that the link between infant mortality and summer diarrhoea is a crucial factor in the explanation of urban rural differentials. Domestic level hygiene featured highly on the agenda of the visitors who were asked to monitor standards in the houses they visited. According to White (1978:133). "*They visited every house to look at its hygiene and sanitary arrangements, see to disinfection, watch over child rearing, feeding and the source of milk supply*", but there is little evidence to indicate whether such advice was willingly accepted.

The second area identified for improvement was the need for an uncontaminated supply of milk. The quality of the milk supply was seen to be an important factor in the control of epidemic diarrhoea, for non- breast fed or weaned infants. An article in the Journal of Hygiene (1903:89-90) indicated that milk was the most common cause of epidemic diarrhoea and that it was usually infected at the farm, or in transit (Newman 1906). This seems highly likely, as milk was sold from open containers in streets contaminated with horse dung and therefore numerous flies - the main vector in diarrhoeal diseases (Morgan 2002). Beaver indicates that "*the onset of this improvement* [in infant mortality] *coincided with the beginning of the movement towards a safe milk supply and the continuation of this*

improvement has, in part been the result of the fulfilment of this development", (Beaver 1973:247). According to Beaver, the major developments in ensuring a safe milk supply occurred in the early 20th century and included cooling, pasteurisation, bottling and drying of the milk products. Condensed milk, first available in the 1870s, was used widely from the 1890s when a sweetened machine-skimmed version, which was cheap and longer lasting, became available. Unfortunately for the infants fed on this product, the risk of malnutrition was an additional hazard (Atkins 1992). These developments according to Beaver, however, allowed health visitors to "propagate *ideas of safe artificial infant feeding knowing that the means were available"* (Beaver 1973:254). Not exactly what had been intended by the reformers and Medical Officers advocating breast feeding at the beginning of the 20th century.

In addition to measures designed to improve the lot of the urban infant and to eradicate epidemic diarrhoea, Newsholme and Newman also made recommendations about the quality of maternity services. Premature birth was according to Newman rising in the last decades of the 19th century; attributable according to Newman to poor maternal care. Maternity services were provided during the 19th century by men and women whose skills varied enormously, ranging from those who had undergone formal professional training to those whose only qualification was that of experience. In order to distinguish those who were skilled, the registration of all qualified midwives was introduced under the 1902 Midwives Act (Fox 1995). The Act forbade any untrained woman to attend a confinement unless under the supervision of a doctor, but despite these measures the attendance of 'handywomen' at the birth continued long after 1902 and there is evidence to suggest that the practice still existed at the time of the introduction of the NHS in 1948 (Dingwall et al 1988). In general however the supervision and training of midwives produced benefits for both the mother and infant and must have contributed to the decline in mortality of the newborn.

The maximum benefit of these improved maternity services was not however achieved until the introduction of antenatal care. Although increasing attention had been paid to the delivery itself during the first part of the 20th century, the concept of systematic planning for childbirth was not generally introduced until the Second World War (Dingwall 1988). The positive effects of a well-planned delivery may be negated by the effect of poor maternal health during pregnancy, which in turn may lead to prematurity. Newman indicated that there was ' ... *little doubt that pre-natal as well as post natal conditions may exert a profound influence upon the problem of infant mortality'* (Newman 1906:89). Such a view is consistent with the theory that the lack of proper planned antenatal care contributed to the delay in the decline of neonatal mortality.

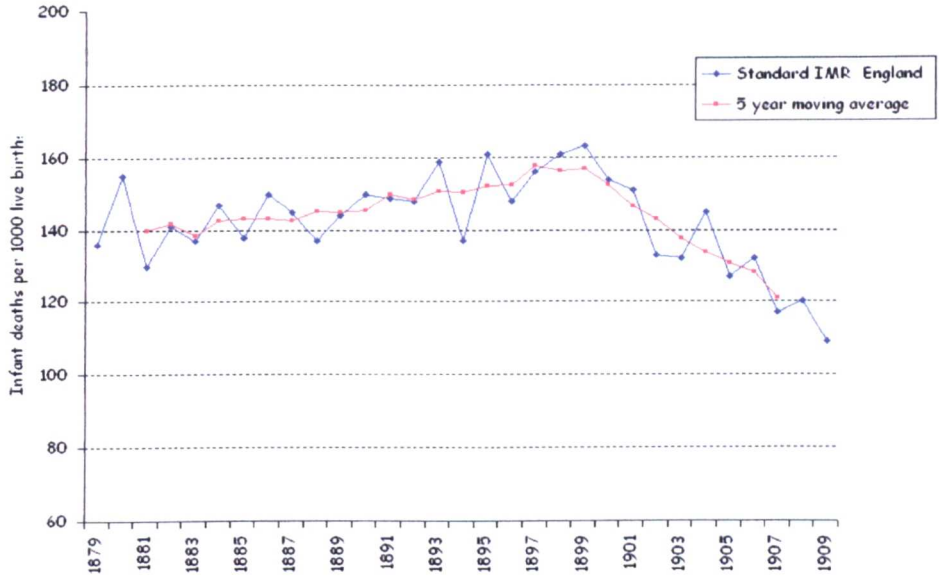
Conclusion

These then were some of the views and actions of key personnel in the infant mortality debate at the end of the 19th century. On the face of it, the success of their wide-ranging recommendations is evident in the subsequent decline of infant mortality that occurred in the early 20th century (Figure 1:1).

The question remains however, as to how and why these measures worked, given the wide range of conditions and variations in the timing of the decline throughout industrial Britain at the turn of the century (Lee 1991). From 1879 to 1909 there seems little doubt that the survival chances for the infant born into an urban environment were less than that for the rural born infant, but whether this was due to the unsanitary nature of the environment or to maternal ignorance as claimed, is unclear. Similarly, no single factor would seem to

account for the dramatic decline in infant mortality rates from the beginning of the 20th century.

Figure 1:1 *Standard Infant Mortality Rates in England and Wales 1879 – 1909*



Source: Registrar Generals' Decennial Reports for England and Wales 1879-1909.

Research in the 20th century has largely concentrated on identifying the contribution of various aspects of the infant experience to the decline. The debate has been wide ranging with contributors from demographic and historical domains among others, although medicine has been largely unrepresented. Authors have addressed subjects thought to be influential on infant mortality such as the urban living (Woods et al 1989); regional differences (Lee 1991); social class effects (Haines 1995); the role of maternal occupation (Graham 1994; Garrett 1998;); seasonal impact (Huck 1997) and age at death differences especially neonatal mortality (Hart 1998; Reid 2001). In general the discussions have used aggregated data from the Registrar General at registration district or sub-registration district level, although more recently more individualised sources have been found, such as the health visitor records used by Reid (2001) and the smallpox vaccination birth and infant death registers identified by Drake (2003 and 2005).
This study aims to contribute to this body of research by examining the urban- rural differences in infant mortality at the lowest level: that of the infant. Rushden, in the Higham Ferrers sub-registration district has provided an ideal setting for an exploration of the urban penalty. Rushden was little more than a large village until the 1880s, when it experienced industrialisation and subsequent urbanisation due to changes in the process of shoemaking. The other parishes of the sub-district, where the impact of industrialisation was less, were available for comparison and for the exploration of rural infant mortality.

In the next chapter the Higham Ferrers sub-registration district will be examined to identify how the industrialisation of shoemaking impacted on the sub-district.

Chapter 2. Higham Ferrers Registration sub-district, Northamptonshire

This study focuses on the Higham Ferrers registration sub-district during the period from 1879 – 1910. In terms of size, the area could be defined as rural, but as Thomas (1883) indicated, the environmental conditions brought about by industrialisation were a crucial factor in the high rates of infant death within parts of the sub-district. Shoemaking, which was the main industry, impacted on the lives of all who lived, worked and were born in the area.

Garrett & Reid (1995) argued that where infants were born was more influential on survival rates than social class and Woods et al (1988) clearly demonstrated the penalty for infants living in urban areas. Whilst much research has focused on the industrial towns of the England and Wales, Hart (1998) found that the size of the urban area *per se,* was not a factor, claiming instead that it was the quality of the environmental conditions that impacted on the infant experience. In common with Szreter (1988), Williams & Galley (1995) argued that high mortality rates in an urban settlement had more to do with the quality of local government and the extent and efficacy of the measures taken to improve public health and welfare. Whilst, views as to why place of birth influenced infants' chances of survival differed, all are agreed that in some way it did.

2.1 Higham Ferrers

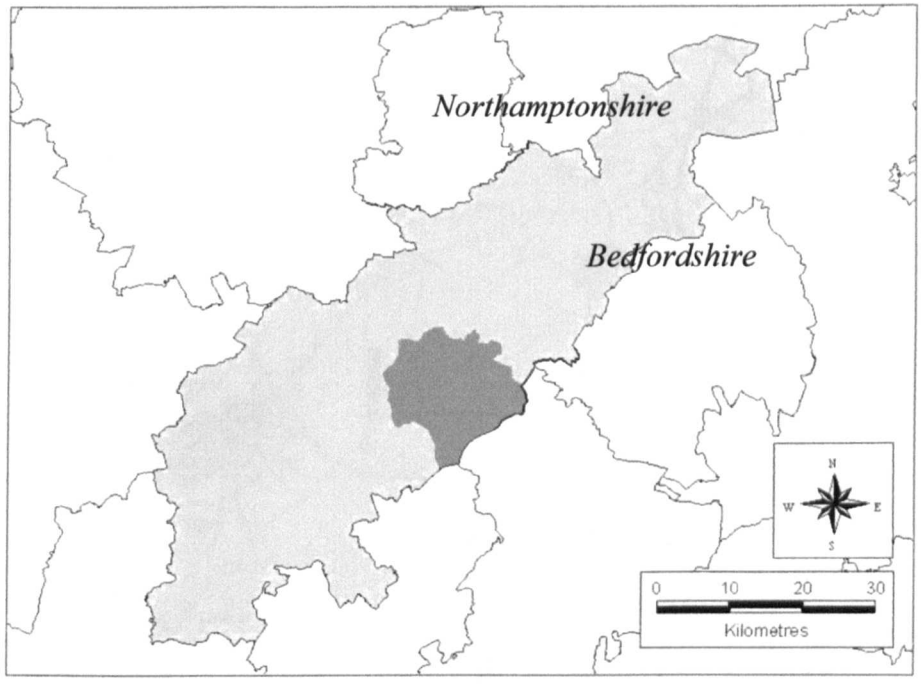
Higham Ferrers was situated in the Wellingborough Registration District in Northamptonshire, a small county located in central England and bounded by seven other counties. Northampton was an administrative capital from 900 AD and Northamptonshire was awarded county status in 1011 (Greenall 2000). In 1871, the county was largely rural and agriculture the main form of employment. Worsted weaving in the 16th and 17th centuries gave way to shoemaking, which experienced a significant growth during the second half of the 19th century. The period of growth was short lived however and by the beginning of the 20th century the shoe industry in the county was in decline and now, in the 21st century, only specialist shoes are made (Morrison & Bond 2004).

The Wellingborough Registration District was based on the boundaries of the Wellingborough Union (Figure 2:1). The Union was formed in 1834 under the '*Act for the Amendment and Better Administration of the Laws relating to the Poor in England and Wales*' which authorised the Poor Law Commissioners to set up Unions administered by guardians and local JPs (Hall and Harding 1985). The Union was the centre for administration of the 1834 Poor Law, under the control of a Board of Guardians. In Northamptonshire, there were 12 Unions, each with a workhouse or sick infirmary. The workhouse for the Wellingborough Union was located in Wellingborough town and exists today as a small community hospital. The Wellingborough Registration District was formed in 1837 when a national civil registration system was set up, to ensure certification of each individual's life events; birth, marriage and death. The office of the Registrar General collated the information collected and national statistics were published in quarterly, annual and decennial reports (Woods & Shelton 1997). In addition to London, the 45 Registration Counties were further subdivided into 614 Registration Districts.[1] The boundaries of the Registration District were largely those of the Union, but each of the districts was further sub-divided into registration sub-districts and these formed the basic unit of the registration system (Woods & Shelton 1997). Functions such as civil

[1] Not all registration districts were within County boundaries and some such as Wellingborough strayed into adjoining counties.

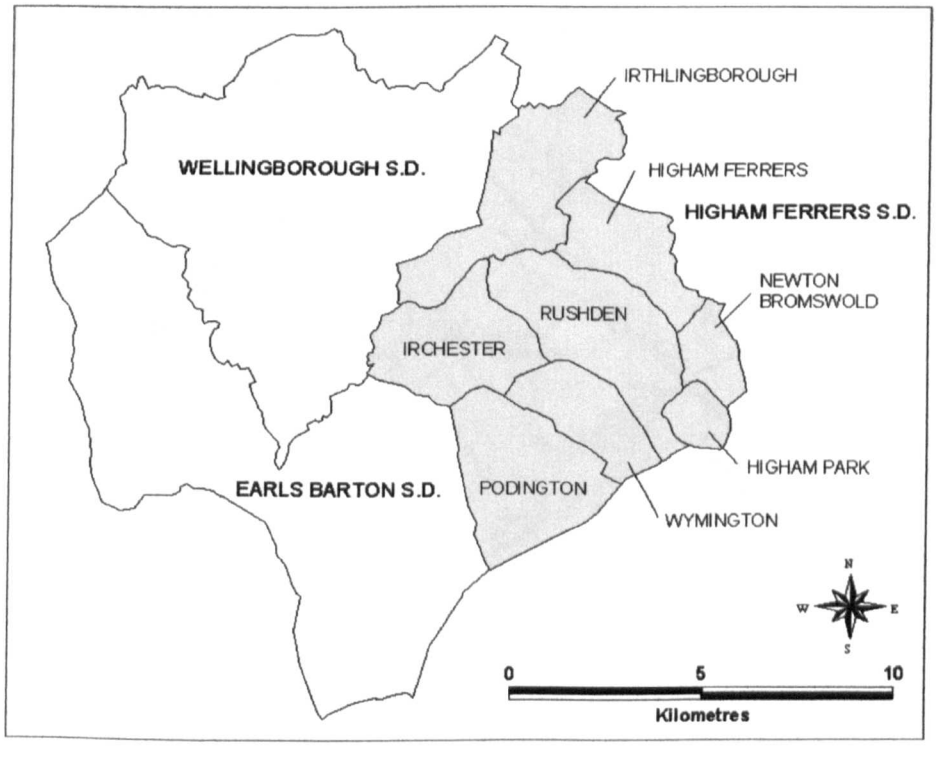
registration (which started in 1837), vaccination (in 1847) and sanitation (in 1875) were carried out at sub-district level.

Figure 2:1 *Location of the Wellingborough District within Northamptonshire: 1891*



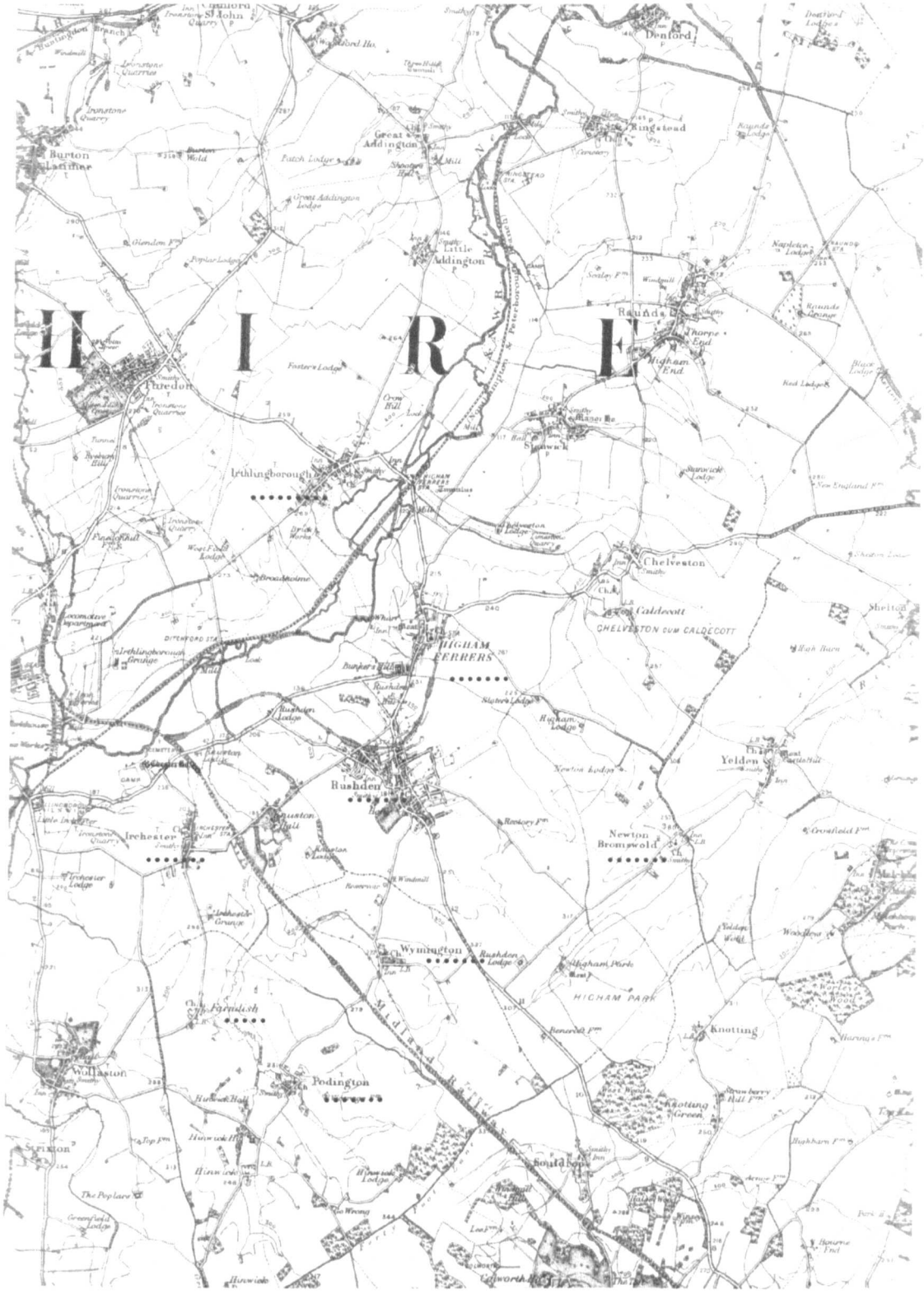
Source: Kindly produced by Nick Burton & Humphrey Southall of the Great Britain Historical database University of Portsmouth, Department of Geography (2005)

Figure 2:2 *Registration sub-districts of the Wellingborough Registration District showing location of parishes of the Higham Ferrers sub-district: 1891*



Source: Kindly produced by Nick Burton & Humphrey Southall of the Great Britain Historical database University of Portsmouth, Department of Geography (2005)

Figure 2.3 *Map of Higham Ferrers sub-district 1897*



Courtesy of Alan Godfrey maps

..... indicates parishes of Higham Ferrers

The Wellingborough Registration District had three sub-districts initially: Wellingborough, Earls Barton and Higham Ferrers (Figure 2:2). Following re-organisation in 1894, the parishes forming Earls Barton were incorporated into the other two sub-districts and Earls Barton as a registration sub-district disappeared. Because of the re-organisation, Higham Ferrers was increased in size to include the villages of Bozeat and Wollaston, but for the purposes of consistency of data, these have not been included in the study.[2]

Higham Ferrers consisted of four small villages: Farndish, Newton Bromswold, Podington and Wymington – a slightly larger village Irchester and three small towns Higham Ferrers, Irthlingborough and Rushden (Figures 2:2 & 2:3).[3] Initially, all the towns and villages came under the jurisdiction of Wellingborough Rural Sanitary Authority formed in the 1870s, but after re-organisation in 1894, were administered through Urban and Rural District councils and village Parish councils. Rushden, Higham and Irthlingborough became Urban District councils but Irchester and
Newton remained within the remit of Wellingborough Rural District Council (RDC) (Figure 2:4).[4]

Figure 2:4 *Local Government authorities 1894 – 1974 in Northamptonshire*

[i] Wellingborough Rural District Council lies to the south of the Wellingborough UDC but is unlabelled

Source: Greenall (2000:126)

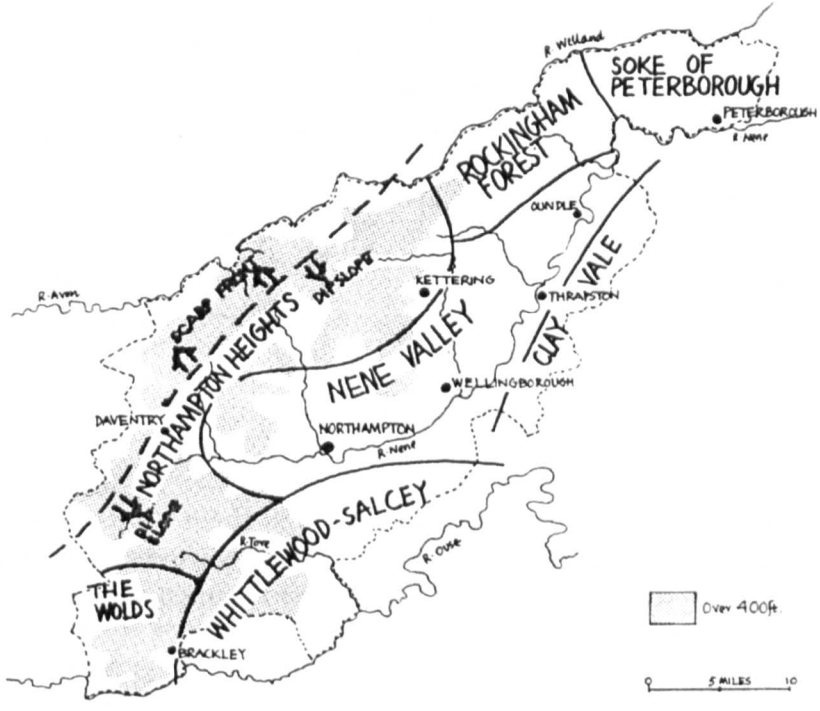
[2] This does however impact on the data and makes comparison with that of the Registrar General more difficult as discussed in Chapter 3.

[3] Newton Bromswold and Podington have been variously spelt within the smallpox vaccination birth registers and other sources but have been standardised in this study for the purposes of clarity. The parish of Higham Ferrers has been called 'Higham' for the remainder of the study to distinguish it from the Higham Ferrers sub-registration district. Data from the two hamlets Higham Park and Hinwick Podington have been incorporated in the statistics for their associated places – Higham and Podington – respectively as the numbers for each were too small to be examined separately. Similarly, data for Little Irchester, which only appears half way through the period, has been incorporated with that for Irchester.

[4] For the purpose of this study, Irchester has been classed as a rural parish or village along with the four other small parishes, because it did not experience the same degree of population growth as the other towns and did not become an urban district after the 1894 reorganisation.

For the three villages situated in Bedfordshire - Podington, Wymington and Farndish - this change also meant that local government was moved from the Wellingborough Sanitary Authority to the Bedford Rural District Council. However, for the purpose of civil registration and vaccination, they remained within the Higham Ferrers sub-district during the period studied and therefore the change did not impact on the data (Greenall 2000). All the towns within Higham Ferrers are situated in east Northamptonshire, in the low-lying area, known as the Nene Valley, near to the River Nene, the County's principal waterway, (Figure 2:5). The Nene Valley is a fertile area created by fine mud deposits at the end of the last Ice Age. Pockets of gravel and sand were also deposited and were heavily mined in the 20th century, creating large flooded areas along the length of the river. Further away from the river, the area is also rich in ironstone and limestone and both have been extensively quarried, especially around Irchester and Irthlingborough (Greenall 2000). The rural parishes lie further away from the river in what was known locally as 'clay vale' - an area between the Nene Valley and the border with Bedfordshire and Cambridgeshire (Figure 2:5). The soil is almost entirely Oxford clay and in ancient times used to be covered by the forest of Bruneswald – a forest in which Hereward the Wake was supposed to have hidden from the Normans (Greenall 2000). The forest has long since disappeared but its name survives in that of the village of Newton Bromswold.

Figure 2:5. *The geographical regions of Northamptonshire*



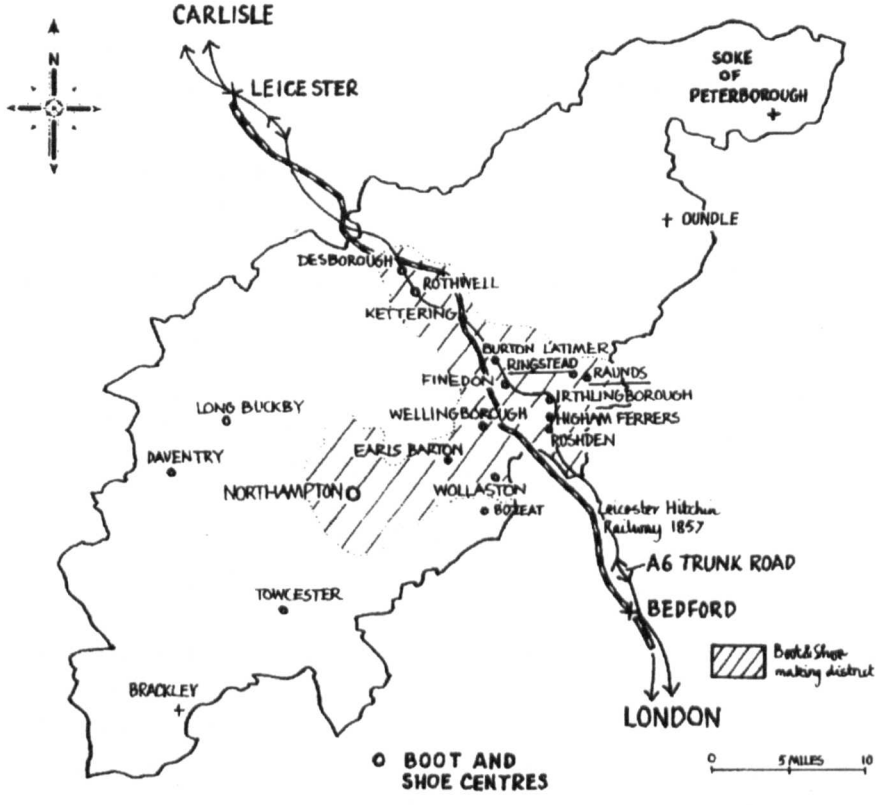
Source: Greenall (2000:17)

2.2 Shoemaking

In common with most of Northamptonshire, Higham Ferrers has had a long association with shoemaking - a cottage industry suited to regions with sparse populations and few raw materials. Those needed, such as cattle, water, and oak wood were readily available from the River Nene and the Salcey and Whittlewood forests. In general, shoe making in Northamptonshire was characterised by outwork with production being an additional or occasional form of employment that the whole household took part in when the opportunity arose (Morrison & Bond 2004). The development of the sub-district as a major shoe manufacturing area was influenced by a series of coincidental events. For example,

the way in which transport links developed in the County had a major impact on the economy of Northamptonshire and ultimately Higham Ferrers.
During the 18th century, developments in the national trunk road system, particularly the London - Carlisle road, caused the London markets to become accessible for agricultural produce and small manufactured goods such as shoes. This resulted in the rapid growth of the towns along its route through the county, including those of Higham Ferrers (Figure 2:6).

Figure 2:6. *The relationship of the railway and main road to shoemaking in Northamptonshire*



Source: Betts 1989:1

The River Nene was made navigable to Northampton by 1768 and, as all the towns in Higham Ferrers were near to the river, it was a useful means of transporting light goods. However, with the coming of the industrial revolution there was an urgent need for a more robust transport system. The canal system, which was in part developed to link the London markets with the northern industrial towns, should also have brought prosperity to the County and Northampton in particular, but because of the cost of traversing the Northampton Heights, the Grand Union canal passed a few miles to the west and Northampton was bypassed. It was not until 1815 that Northampton got a branch line - just in time to prevent the emerging shoe industry from being destroyed due to lack of adequate transport measures (Greenall 2000).

The development of the rail network affected the economy of the county in a similar way. The first railway in the county - the Midland Railway Leicester to Hitchin line –which was built in 1857, bypassed Northampton and as a result, the focus of the shoe industry moved to Leicester. Nonetheless, the situation for Higham Ferrers was much improved as a result of the railway, because like the London to Carlisle road, the railway dissected the sub-district with a station at Irchester (Figure 2:6). This was followed by a branch line from

Wellingborough to Higham and Rushden in 1894. The railway was a major factor in the expansion of the shoe industry within the sub-district, as it opened up new markets and improved the supply of raw products.

At the same time as the development of the transport systems, the Northamptonshire shoe industry also received a major boost, in the form of orders for army boots from the French Government. The county had already gained a reputation for cheap army boots and men's shoes.[5] The low price of boots was maintained, not by increasing production through the mechanisation of the process, but by employing large numbers of women and children, thereby keeping wages low (Morrison & Bond 2004). Notes in the 1891 census indicate that the ratio of women to men in shoemaking in Northamptonshire was 40: 100 compared to 23:100 elsewhere in England (Registrar General 1892:xx). Closing of the shoe or boot was (and still is) almost exclusively the role of women, whilst children as young as 6 -7 years were taught stabbing and stitching (Greenall 2000).

Despite the fact that machinery became available to facilitate production, the move to complete factory manufacture was drawn out. The first factory to be built in the county was built in Northampton by Manfield, to accommodate the Singer sewing machine, which was introduced from America in 1856-7. However, the shoemakers' dread of mechanisation and more importantly control of their working practices, caused a strike and Manfield eventually capitulated. The factory was used as a warehouse until 1864 when the Blake sewing machine was introduced making factory production inevitable. Unlike the Singer sewing machine which could be housed in homes or workshops, the Blake machine required a more industrial setting because it was driven by a steam powered engine (Swann 1986). Machines to rivet or peg the sole to the uppers, invented in the 1860s, were also instrumental in forcing a change in the manufacturing process, despite the intense resistance from the shoemakers. The previous 'cottage industry' type of production where each family was involved in making a whole pair of boots or shoes, gave way to more specialised separate processes of clicking[6], closing[7], making[8] and finishing[9]. Whilst clicking and making took place in factories because the machinery required a more industrial setting, closing and finishing continued to be put out to outworkers for much of the 19th century (Betts 1989). In the majority of homes, women sewed the parts of the uppers together by hand, but as the Singer Sewing machine became cheaper and more readily available, those who could afford to do so bought their own, usually through a hire purchase agreement (Swann 1986). Closing rooms or workshops (the forerunners of shoe factories) were introduced by those who could afford several machines. In some cases, the women were employed, but in others, they 'rented' the machine and continued to be self-employed, buying the shoe components from the factory and then selling the completed articles back. The workshops or closing rooms were often within the worker's house,

[5] Shoemaking in the County continues to be exclusively shoes for men with children's and women's shoes made in East Anglia and London respectively.

[6] Clicking - cutting leather into shape to form the uppers was carried out in a workshop and then in a factory by men. Highly skilled.

[7] Closing - stitching of the leather pieces together to form the uppers by women. Demanded initially a high level of skill but with the introduction of the Singer sewing machine became a less skilled task (though still female). The most expensive shoes today continue to be hand stitched.

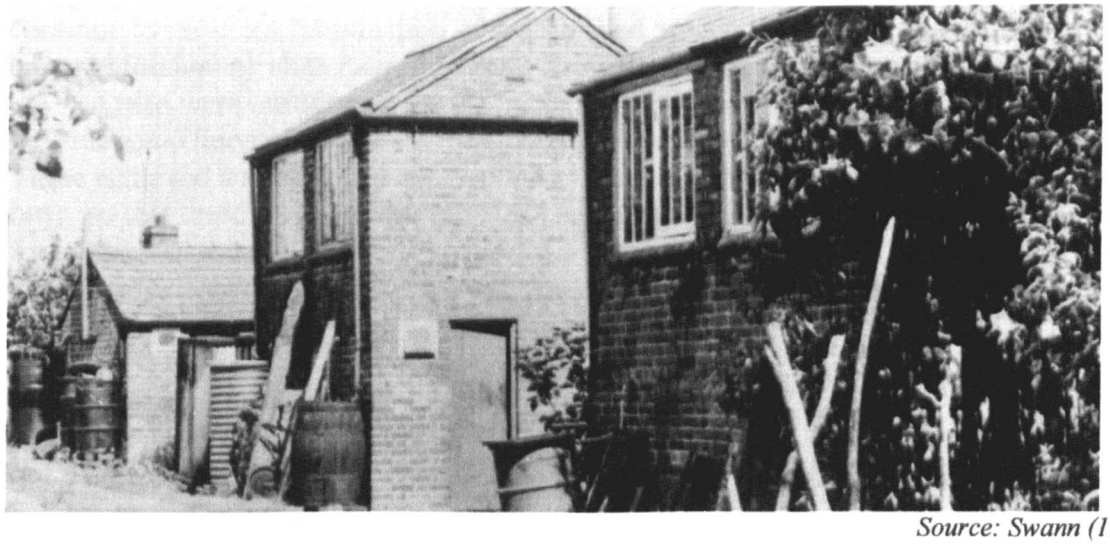
[8] Making - involved several operations such as joining the sole to the upper, adding the heel and finishing. In general carried out in the home or workshop until riveting or nailing of the sole to the upper forced production to move into factories. Relatively unskilled but with some highly skilled aspects Usually male occupation.

[9] Finishing – completion of the process and involved trimming, polishing and adding ornaments such as bows and laces.

usually in a bedroom, or in a shed in the back garden, with several such workshops or rooms within a street. (Greenall 1979) (Figures 2:7 & 2:8).

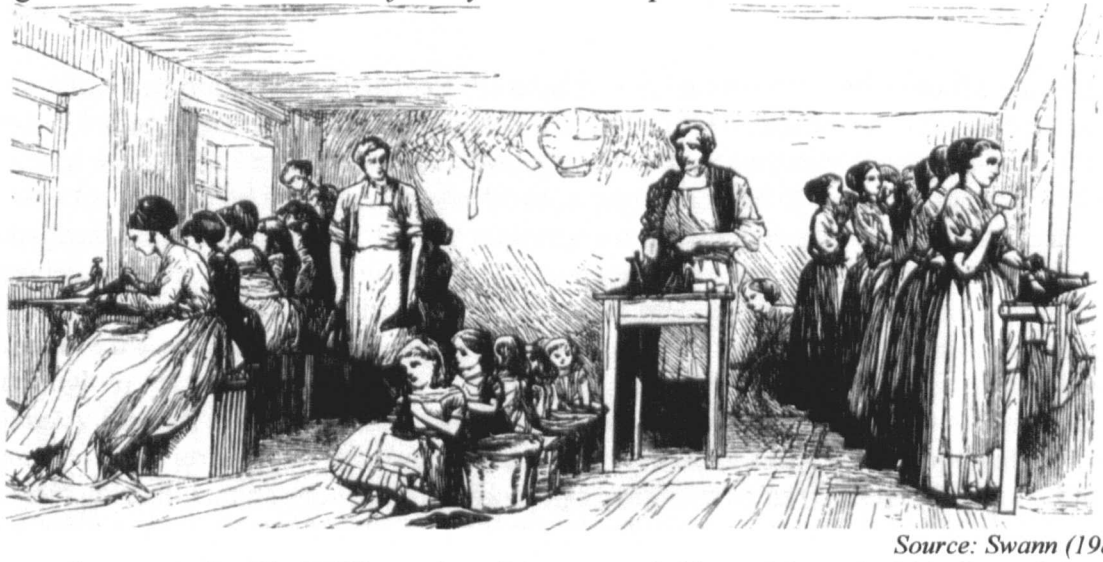
One author of an article in *The Boot and Shoe Journal* in describing the working lives of women closers, wrote in 1886 "in *the houses of the working classes one or more rooms are occupied by machinists and fitters and in these the feminine portion of the community vary the operations of putting on quarters and seaming linings with excursions to the kitchen to see how the dinner is cooking or superintending the mysteries of the family wash*"
(cited in Kirby et al 1988:14)

Figure 2:7. *Workshops in Long Buckby Northamptonshire*



Source: Swann (1986:20)

Figure 2:8 A *machine closers 'factory' in Northampton 1869*



Source: Swann (1986:18)

In another example, Flo Williams describing her neighbours' household indicated that: *"[Mrs Roberts] lived at No. 75 Oliver Street and she made ... her front room into a workroom and she had one, two, three machines in there, closing machines and so that [sic] would be two ladies working for her, and one used to take some work home and she used to do the closing"* (cited in Kirby et al 1988:18)

Whilst the women developed their own home-based factory system, the men resisted the move to factories at each stage of development and instead developed increasingly sophisticated techniques for making hand-sewn shoes in the attempt to delay the

introduction of machinery. Their strong opposition arose from the desire not to be 'managed' or have their working practices controlled. They feared for example the loss of 'St Monday' a long-held tradition in the shoe trade (Appendix 1).[10] Many were concerned by the potential impact industrialisation would have on women's work, because piecework allowed the woman to supplement the family income by working within time constraints imposed by the household. There was also resistance from some employers who foresaw rising costs if piecework was replaced with day work and fixed working hours.

Widespread development of total factory production of shoes and boots was delayed until the 1890s in Northamptonshire, when the need to modernise the process in order to compete with other manufactures – particularly the Americans - made it impossible to continue to resist the introduction of mechanised processes. In turn, this led to fierce competition among shoe manufacturers, rising prices and a consequent loss of orders. As the factories were introduced, the militancy of the workers brought about the formation of the National Union of Rivetters and Finishers and a number of strikes for better conditions. These achieved a standard 54 hour working week and restrictions on the employment of boys, so that there was more work for the men (Swann 1986). In 1905 the Raunds March for higher wages and an end to the tendering system, whereby men were part-paid in vouchers for goods (to be bought at the shops of factory owners) led to a slow decline in the industry that continued throughout the 20th century (Betts 1989).

2.3 Population growth

As can be seen from Figures 2:2 & 2:6, the main concentration of urban district councils and therefore the principal towns, were located in the shoemaking belt along the path of the London to Carlisle road and the London – Leicester railway. Apart from Northampton, Towcester and Daventry (all shoemaking towns), the only other sizeable settlement in the 21st century is Corby, which grew and developed as a result of ironstone workings in the 20th century. In common with the other forms of industry in the county, this too has since diminished.

The pattern of population growth of the county was inextricably linked to the shoe industry and as factory manufacture increased so too did the urban population. This was particularly evident during the 1890s, when the development of shoe factories forced migration to the towns for work. The increased labour force in part consisted of migrants moving to the area from outside the county, but the majority were local men and women who had previously been agricultural workers. Three poor harvests in succession at the beginning of the 1870s had led to wide scale unemployment among agricultural workers and therefore the opportunity to change occupations for one that was seen as more reliable - although in some cases poorly paid - was welcomed. This movement from agriculture to industry limited, to some extent, the overall population growth of the county because mainly 'home grown' workers were used and as a result the key Northamptonshire towns remained small compared with other more industrialised areas (Greenall 2000).[11] From another perspective, the development of the shoe industry by providing alternative employment enabled people to remain within the county rather than to migrate out, thereby preserving population levels (Greenall 2000).

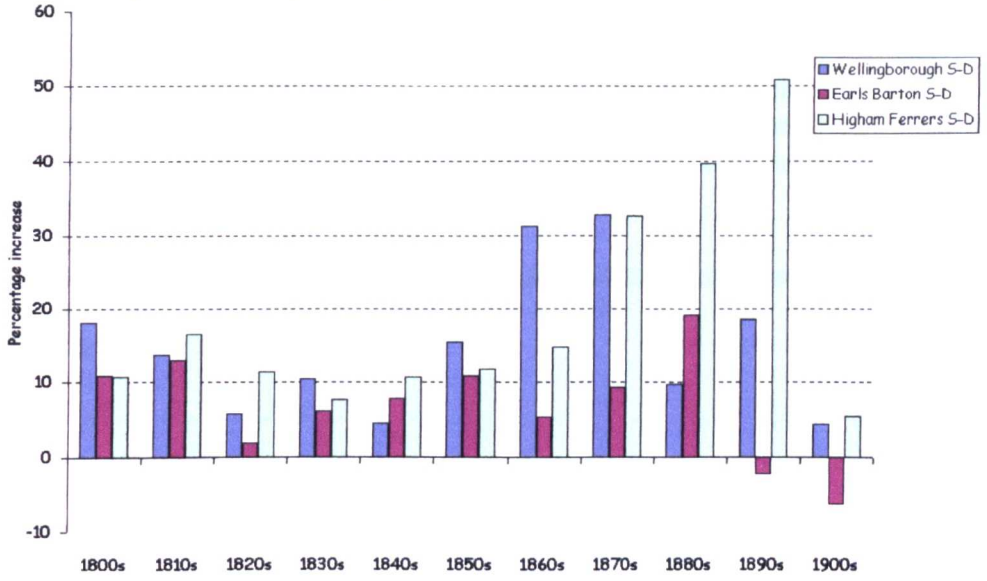
This overall pattern of population growth masked several differences between the sub-districts exemplifying the progress of the shoe industry and the development of the main

[10] St Monday or Snobs Monday - shoemakers - 'snobs'- in Northamptonshire were renowned for being unfit to work on Mondays following a drunken weekend. Fixed factory hours would have seemed untenable to men used to working when they felt like it (Betts 1989).

[11] The population of Northamptonshire rose from 212380 in 1851 to 363402 in 1911 – a rise of 71%

towns (Figure 2:9).

Figure 2:9 *Comparison of decadal percentage increase in the population of the sub-districts of the Wellingborough District 1801 -1911* [i]



[i] Earls Barton ceased to exist as a sub-district after 1894, but for the purpose of the study, the data for individual parishes was collated to illustrate the events taking place in the District.

Source: Census Reports (Kettering Library)

The increase in population in the Wellingborough District at the beginning of the 19th century occurred initially in all three sub-districts, although the increase in Wellingborough sub-district, at 18%, was greater than that in the other two. The greatest increase in the 1860s and 1870s, also took place in the Wellingborough sub-district with the population increasing by over 30% in both decades. The rate of increase in the sub-district was significantly less at 10% in the 1880s, but rose again in the 1890s and then fell after the turn of century in common with all the other areas.

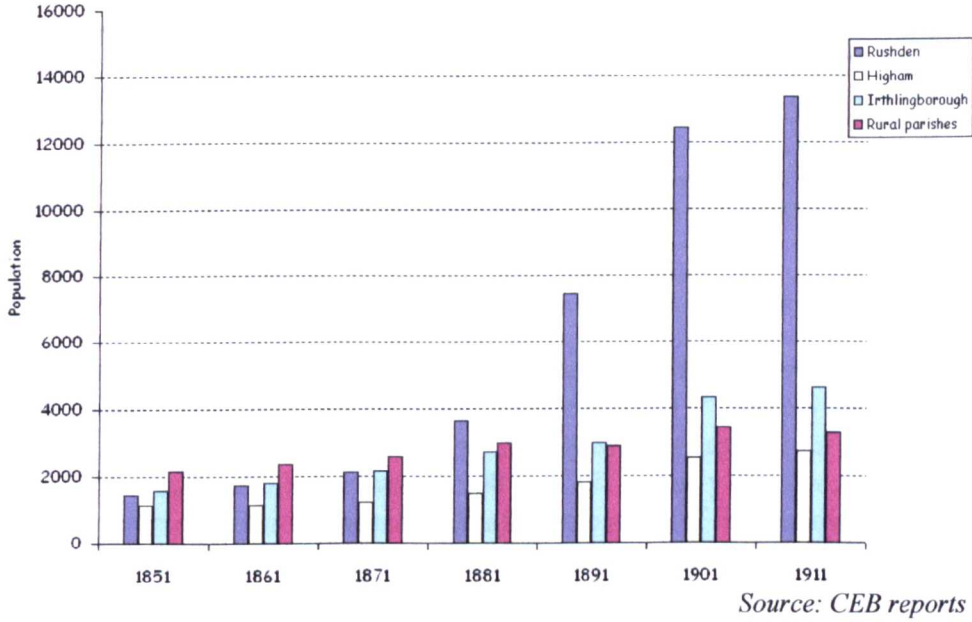
As can be seen in Figure 2:9 Earls Barton, which ceased to exist as a sub-district after 1894, experienced a decline in population from the 1890s onwards. Earls Barton, the main parish only had a population of 2602 in 1891 and was therefore very small in comparison with the main towns of the other two sub-districts (Figure 2:9).

Until the 1860s the population of Higham Ferrers increased by approximately 10% per decade, but the expansion of the shoe industry brought with it a rapid increase in population (Figure 2:9). As in the Wellingborough sub-district there was a 33% increase in the 1870s, but unlike Wellingborough, the population in Higham Ferrers continued to rise with increases of 40% in the 1880s and 51% in the 1890s. The rate of increase fell after the turn of the century to 5% indicating the dramatic impact of the demise of the shoe industry.

By the end of the 19th century, Rushden was without doubt the major town of the sub-district, with a population that had risen from just over 2,000 at the beginning of the study period in 1871 to 13,354 in 1911 - an increase in excess of 550% (Figure 2:10). When compared with development on this scale, the growth of the other towns was minimal. Irthlingborough and Higham both experienced population growth during the 1890s as the demand for boots and shoes grew and production spread to smaller towns and villages within the sub-district (Morrison & Bond 2004) (Figure 2:10).

Although the rural parishes overall experienced a decrease in population during the 1880s, (possibly as a result of movement to Rushden), Wymington experienced a minor population explosion when large scale railway building involving a tunnel and a viaduct provided employment for both local men and in-migrants. A report in the *Bedfordshire Mercury* (1882) indicates that 800 men, in addition to their wives and children were billeted in a railway encampment. However, these figures have not been substantiated and the 1891 census in fact records a decrease in population compared to that of 1881. A third (57) of the infants born in Wymington during the 1880s were born to fathers who worked on the railway, but it would seem that the encampment came and went during the inter-censal years.

Figure 2:10 *Comparison of the decadal percentage increase in the population of the parishes in Higham Ferrers from 1851 – 1911*



Source: CEB reports (Kettering Library)

For the remaining rural parishes, growth throughout the period studied, was slow and the impact of shoemaking limited, although the industry became the major form of employment for the inhabitants by the late 19th century.

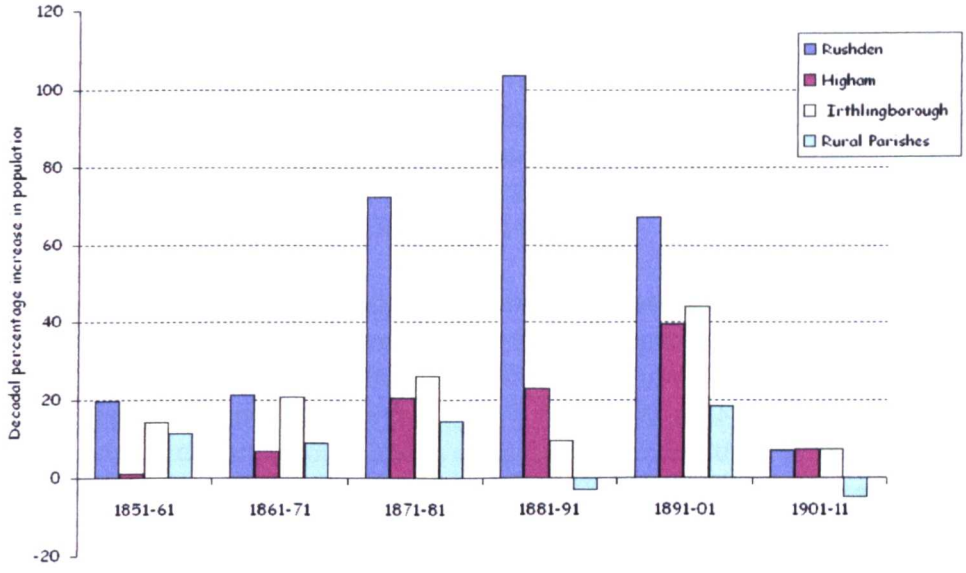
2.4 Rushden

As a result of industrialisation Rushden in particular experienced rapid population growth which according to Morrison & Bond (2004:8) '*has been compared to a 'gold-rush' town* (Figure 2:11).

Rushden's prominence over the other towns as the key site for industrialisation would seem to be little more than an historical accident that occurred centuries earlier in 1298, when the Soke of Higham became the property of the Duchy of Lancaster. Due to the remoteness of the area from the Duchy's main holdings, officials were brought in to Figure administer the various communities. Different styles of land tenure resulted, with the Duchy officials in Higham retaining a greater hold over the land. Rents were high compared to Rushden where the Soke copyholders were given the freedom to split up and sell off the land in return for peppercorn rents. Therefore, when the need arose for building land for the development of shoe factories, manufacturers turned to Rushden where the Duchy was willing to release the land for which the income was poor. In contrast, in Higham where the Duchy had retained greater control and the rents were high there was little incentive to sell. Without this quirk of fate, any of the other towns within the sub-

district could have experienced the same development afforded to Rushden, especially as the topography and surrounding environment are similar (Hall & Harding 1985).

2:11 *Population of the towns and villages of Higham Ferrers from 1851 – 1901*



Source: Census reports (Kettering Library)

The exponential increase in population in Rushden, brought with it features common to many urban settings developing on this scale in the 19th century: overcrowding, an insufficient supply of clean water and inadequate drainage and sewage disposal systems (Sheard & Power 2000). Between 1900 and 1910 nearly 40 new roads were adopted by the Rushden Urban District Council indicating the scale of the building programme (Hall & Harding 1985). Much of 'old' Rushden was knocked down in this process, to make way for the newer terraces. Building was unplanned however and evidence for overcrowding comes from the numerous prosecutions cited in the Rushden Urban District Council (RUDC) minute books. In 1901 the following graphic report was printed in the local newspapers indicating the scale of concern:

> *"Rushden had grown too rapidly for the capacity of those who control it. It has outgrown its clothes and has altogether been too busy to get measured for new ones.....fires were frequent because boot and shoe factories were full of combustible materials. They were also crammed with workmen and they relied upon a few back garden wells for a water supply."* (*Rushden Argus* August 2nd 1901)

On the positive side however, facilities in the town eventually improved, and not only those concerned with public health measures, but also those for leisure. A free lending library was built in 1905 and the Rushden athletic club with 500 members was set up in 1898. The conservative club built in 1888 included a lecture hall for its 240 members. Numerous other organisations also developed during this time, including the Ambulance Association and the Nursing Association. There was also an enormous school building programme, with the number of places available in 1881 more than doubling in less than 10 years. The growth in population and to some extent prosperity for the town came to an end at the beginning of the 20th century, with the former rising by less than 7.2% between 1901 and 1911. The shoe industry was in recession and unemployment was common. Nonetheless, the period of growth had, by 1910, turned a large straggling village into a well-organised and reasonably healthy town with modern public health facilities.

2.5 Water and sanitation

Apart from overcrowding, the overriding problem of urban settlements during the 19th century was the provision of adequate clean water and a satisfactory sanitation system. Higham Ferrers was no exception. The improvement of water supply and sanitation was a major issue during the latter half of the 19th century and the vast amount of information available from Medical Officer of Health reports, Council minute books and documents relating to the Higham Ferrers' Water Board Acts indicates how importantly the issue was regarded at the time. In general, the issues of water supply and sanitation were linked with health and, in particular, freedom from infection. For the Rushden town councillors, (who were usually property owners), cost was not an insignificant factor, however, and from the minutes of the Rushden Urban District Council (RUDC) meetings, on occasions took precedence over health issues (RUDC 1893 -1910).

Water for the urban parishes generally came from shallow surface wells which were subject to pollution from sewage overflowing from cesspits, storm water; waste from slaughter houses and, in Rushden, from shoe factories. In addition, Agnes Hunt, a Queens' nurse, employed in Rushden during the typhoid epidemic of 1892, described the problems inherent in having a cemetery on a hill overlooking the town, through which water drained to the town wells! (Hunt 1938). In another example of the problems that existed, well water was found to be contaminated by carbolic acid that had been used to flush a nearby sewer (MOH Report 1871). Reports in the RUDC minute books identify clearly that the problems related to contaminated water were understood and pumps were often listed as unusable, but as Hunt indicates this seldom led to effective action. *"The local authorities would come round and condemn the pump and carefully tie it up with a label to say that the water was unfit for human consumption, but, as no other water was forthcoming, the pump was quickly untied."* Hunt (1938:100). Handbills were circulated with regularity to warn of the need to boil water and this may have contributed to a decline in mortality even though the means to eradicate waterborne diseases completely were not available. In 1893 in a supplement to his annual report, the MOH graphically describes the scale of the problems created by a lack of a clean piped water supply in Rushden, but it was not until 1906 that the situation was fully remedied and everyone in the town had a clean supply of water.

An interim improvement was made in 1893 to the water supply in Rushden, by the construction of waterworks in Wymington. The supply, providing 10 gallons per person per day, was on intermittently for 10 hours, 6 days a week until 1903, when water was additionally provided on Sundays. Property owners were responsible for financing the laying of pipes to their own properties, but as the water rates for a sizeable house with a rateable value of £16 were 4s and 6d. per quarter, not all were willing to provide the water for their tenants. As Rushden expanded, this supply was soon insufficient to meet the increasing need - a problem compounded by the dry summers of the late 1890s. These affected the supply, both because the amount 'harvested' was less, but also because, as the shallow wells in the town started to dry up, a greater need for town water was created. In 1897, it was reported that the volume had decreased to less than half of that available in 1893. Despite several attempts to find additional supplies, none succeeded until the opening of the Sywell reservoir on July 2nd 1906.

The situation in the other towns was similar, although unlike Rushden, none were able to find additional supplies and all, therefore, used surface wells until the opening of the reservoir. Numerous MOH reports identify clearly the problems this posed for the health of the inhabitants. Dr Home in his report in 1871 cites Higham as having water for domestic use supplied by wells 30 - 40 feet deep into the limestone stratum to the blue lias

clay (MOH 1871). There were five public and 84 private wells in the town with about a third of inhabitants using the water of the larger town pump, as their own was 'bad'. Even this water, he indicated, was contaminated by storm water because the pipe that led from the well to the pump was carried through a porous brick culvert. The situation improved little before 1906.

The water supply for Irthlingborough was very poor during the period under study and mostly taken from the river or brook, both of which were contaminated. However, in 1909 a report indicated that two wells - one of 270 feet supplying 90,000 gallons daily and a new well sunk in 1907 yielding 12,000 gallons daily, were able to supply the needs of the town (Woodward & Thompson 1909).

In Irchester numerous wells existed - the majority drawing water from Great Oolite limestone, though at very different levels owing to one or two 'faults' cutting the village. Examination indicated that the water was unusually high in chlorides, sulphate and carbonates and at various times the water was said to be heavily polluted (Woodward & Thompson 1909).

The first Water Act was discussed in 1895 but there was much opposition especially from the Overstone Estate. Eventually, following a debate in the House of Lords, the Higham Ferrers Water Act was passed in 1900 allowing the setting up of a Water Company. This was to supply water to Higham, Bozeat, Irchester and Irthlingborough. from a reservoir to be built in Sywell. (Overstone Estate Papers 1900). Piped water was finally laid on in 1906 - the delay caused by the inadequacy of the rainfall that meant that filling the reservoir took over a year. By the time water was available, Rushden, too, had also joined the scheme.

The situation in the villages was however very different. In Wymington, there was a good supply of water from springs and from deep wells, which were free from contamination. This was sufficient during the 1890s to supply the town of Rushden and to be used for irrigation purposes. Unfortunately, the excessive amount taken by Rushden was sometimes detrimental to the supply but in general, it was adequate. A farmer who complained that his cattle's drinking water had been affected was able to get the Rushden town water piped to his field at a time when there was still insufficient to meet the needs of the inhabitants! (RUDC 1893). Farndish, Newton Bromswold and Podington all were supplied with deep well water and springs and the Medical Officer for Bedford Rural District Council on a visit in 1895, reports: "*...water tolerably abundant and throughout the parishes it is obtained from springs and wells. There is an abundant spring at Podington about the centre of the village especially, supplying a large number of houses, perhaps 40 or 50. There are also two other good springs of the same description in Podington and one in Farndish. .... On enquiry I did not hear of any case of epidemic disease*" MOH Report Book (1895 BRO). The supply of water therefore in the parishes making up the sub-district may have had a significant impact on the health of the inhabitants, and if the Medical Officers were to be believed, the sanitary arrangements even more so.

By 1871 each of the main areas had some form of sewage drainage system but where this was dependent on water for flushing, the system was often inadequate, especially in dry months. In Higham, for example, water for flushing purposes had to be brought up to the town from the river by horse and cart (MOH 1871). The sewage from Rushden was discharged directly into the Nene, much to the annoyance of Northamptonshire County Council, and it was not until 1895 that land was bought for a sewage farm (RUDC 1895). Cesspits and/or 'privies' were the normal means of disposing of human waste but between 1870 and 1890, most of the main towns had instituted a 'pail' system and night

scavenging. The Rushden MOH in 1893 indicated the effectiveness of this method, although he urged the Council: *'...that the proper course to pursue to prevent this* [contamination as the town gets larger] *would be by adopting a system of irrigation or a modification of it called the separate system. This could be effectively carried out and it would be advisable to get the advice of a practical engineer upon the same and the best means of sewerage to be adopted'* Dr Owen (RUDC 1893).

When daytime scavenging of refuse was included, the towns took on a cleaner aspect and various Medical Officers and Inspectors of Public Nuisances reported the importance this had in reducing infection. For example in 1898, the MOH reported in Higham Ferrers, that the abolition of cess pits were complete and that as the scavenging system was working well, the shallow wells were less contaminated (*Rushden Echo* 1898). By the end of the 19th century, water closets connected to the piped water supply, were seen as essential for the health of the inhabitants, but it was not until 1906 that this was achieved. Little is known about the drainage arrangements elsewhere, although the MOH in 1901 reported the drainage in Irchester and Irthlingborough to be unsatisfactory (*Wellingborough News* 1899a). No mention has been found of the arrangements in the rural parishes, but as the MOH was quite detailed in his preliminary report in 1895, it would seem likely that no obvious problem had been identified.

Conclusion

In Higham Ferrers, during the period studied from 1879 to 1910, the series of major changes initiated by the industrialisation of the shoe industry included a rapid growth in population, urbanisation and deterioration of the physical environment as well as changes in working practices. Many people moved from the rural villages to the towns (although not very far in most cases), changed occupations from agriculture to shoe making and by the end of the century were working in factories that were often overcrowded and unsanitary. The employment of women and children increased, as the demand for cheap army boots grew, but as the manufacturing process became mechanised, the working environment for those unable to afford their own sewing machines moved from the home to workshops. In compensation, wages were initially higher for some, transport improved and new houses, leisure activities and schools became available.

The changes that took place, especially those resulting from rapid population growth, occurred mainly in Rushden, but the impact of industrialisation was also seen in the other towns and villages of the sub-district, albeit to a lesser extent. As a result Higham Ferrers provides a rare opportunity to explore the effect of industrialisation, urbanisation and population growth on the infant experience and make comparison with those areas which remained essentially healthy for the infant.

The industrialisation process occurred later in Higham Ferrers than in many manufacturing settings in England and Wales and therefore data from the Registrar General's reports provided accessible information at sub-district level to explore infant mortality. In addition, data were also available from smallpox vaccination birth and infant death registers, to explore infant mortality within Higham Ferrers at individual parish level. These sources, together with a range of other materials such as the Census Enumerators Books, Medical Officer of Health reports and minutes of Council meetings for the period from 1880 – 1910, indicate that the exploration of the Higham Ferrers sub-district has an important contribution to make to the debate on the mortality experience of the urban infant.

Chapter 3 Sources and Methodology

Sources used to explore the infant experience in the Higham Ferrers sub-district for the years 1879 –1910, were of two kinds: quantitative data used to calculate infant mortality rates and provide evidence of trends, and qualitative data from primary and secondary sources, used to explore the conditions under which infants lived and died in the sub-district.

The main quantitative sources used to gain infant mortality information were the Registration returns or Registrar Generals' Quarterly reports and the smallpox vaccination birth registers (NRO, PL12 /378 – 403, 1879–1910) and infant death registers (NRO PL/161-162, 1871-1893).[1]

3.1 Registrar Generals' Quarterly reports

The Registrar Generals' Quarterly reports were available for all years covered by the study and gave information on a weekly or quarterly basis at sub-district level. They provided information in relation to births and infant deaths per calendar year, thus allowing for the calculation of standard infant mortality rate (the number of infant deaths per 1000 live births per calendar year). The statistics were produced at national, district and local sub-district level and therefore it was possible to compare the infant mortality rate (IMR) for Higham Ferrers with that of the other sub-districts making up the Wellingborough District, with the district as a whole, with the county of Northamptonshire and with the national rates. However, following the re-organisation of the Wellingborough Registration District in 1904, Earl's Barton ceased to exist as a sub-district and the parishes were added to either Higham Ferrers or to the Wellingborough sub-district. This had the effect of enlarging Higham Ferrers and therefore making analysis after 1904 potentially more difficult. The births from Earl's Barton added an additional 6% to those recorded for Higham Ferrers in 1904, 17% in 1905 and 20% in 1909. Therefore all the years post 1904 have been omitted from any detailed analysis using the Registrar Generals' data in this study, because the environment of birth and infant death was potentially different for those born outside Higham Ferrers.

As the Reports were produced quarterly, they could also be used to identify seasonal variations – important in the light of Woods et al (1989) and Williams and Galley's (1995) view of the role of summer diarrhoea in influencing infant mortality at the end of the 19th century. The information was however, derived from dates of registration and not actual dates of birth and death and therefore must be used with caution when discussing seasonality, because deaths in one season may not be registered until the next. The notes accompanying the data also give an indication of extreme climatic conditions and outbreaks of infectious diseases in the sub-district, which helped to provide background information when discussing the environmental aspects of infant mortality.

The quarterly information on births and infant deaths for Higham Ferrers was transcribed from the Registrar Generals' Quarterly Reports for all years from 1879 to 1910, together with that for Northamptonshire, the Wellingborough District and the other sub-districts of

[1] The Registrar General's Quarterly Reports for the Higham Ferrers sub-district are found in two forms i) Registration Reports (England) Quarterly and Weekly MRC for 1880 - 1888 and ii) Quarterly Returns of the Registrar General 1888- 1910 and were accessed at the London School of Hygiene and Tropical Medicine. For the remainder of this study the combined reports will be known as the Registrar Generals' Quarterly reports as this most clearly describes their characteristics.

Wellingborough and Earls Barton. An Excel database was then compiled and used to provide comparative information on infant mortality and season of birth and infant death.

3.2 Small pox vaccination birth registers (VBRs)

For the purposes of this study it was also important to have data at the micro level to add Detail to the numerical data provided by the Registrar General, because only at the level of individual infants can the influences resulting in death in infancy be determined (Williams and Galley 1995). The central source for such data has been the hitherto largely unused smallpox vaccination birth and infant death registers. The registers were produced as part of a national system to eradicate smallpox through compulsory vaccination. Smallpox had for centuries been the scourge of populations throughout the world, causing death in 1 in 7 of those infected (Loosmore 1996). Treatment was minimal and those who survived were often severely maimed. Variolation was the only widely known form of protection until May 1796, when Dr Jenner presented his findings on human-to-human inoculation using live infectious material from individuals infected with cowpox, which he termed 'vaccine' (Wolfe and Sharpe 2002).[2] The use of vaccination then became widespread, but as the vaccine could not be preserved, and was not readily available because cowpox infections occurred only rarely, the human-to-human method continued and children were used to transport it around the world by vaccinating them in succession.[3] On one such trip, organised by King Carlos IV of Spain, 230,000 vaccinations were carried out in Central America, the Philippines and eventually China (Loosmore 1996).

Originally variolation and then vaccination, were promoted chiefly through charitable sources such as the first National Vaccine Establishment founded in 1808, but following the first Vaccination Act in 1840, vaccination became the remit of the Boards of Guardians (Greenwood 1901).[4] Under the 1853 Act, vaccination became compulsory and to assist in compliance with the Act, a system of registration based on the civil registration system was set up. The Registrar of Births and Deaths was required to give statutory notice of the need to have the child vaccinated, usually to a parent, at the time of registration - i.e. within 42 days of the child's birth. The notification indicated that the child should be taken for vaccination within 3 months of birth and gave places, dates and times of relevant sessions. Parents were then under a legal obligation to take the child for vaccination and return a week later for inspection and to provide lymph for the vaccination of another infant (Simon 1872). A penalty of 20 shillings or a prison sentence could be imposed for failure to comply with the law: the fine or imprisonment to be repeated if non-compliance continued (Durbach 2000). Within the terms of the 1867 Act, the Board of Guardians were ordered to contract with a registered medical practitioner who would serve as the Public Vaccinator. In addition to the qualifications of a District Medical Officer, the Public Vaccinator was also required to have a certificate of proficiency in vaccination techniques but after 1886, vaccination skills were incorporated into the general medical training.[5] The minimum payment, as laid down in the Act, was 18 pence for each successful vaccination, with additional payments for re-vaccination. An additional sum was also paid for a report, which was required to be sent annually to the General Board of Health by the Vaccinator

[2] Variolation – inoculation of lymph derived from smallpox; Vaccination – inoculation of lymph derived from cowpox (Baxby 1999)

[3] This issue will be discussed further in Chapter 8

[4] As a result of which vaccination was bedevilled for generations through its association with the Poor Law (Durbach 2000)

[5] The qualifications for District Medical Officers (DMOs) were defined by Greenwood (1901) prior to 1886 as being registered under the Medical Officer's Orders December 10th 1859, which qualified him to 'practise medicine and surgery'. After 1886 DMOs had to be registered under the Medical Act.

(Greenwood 1901). The Public Vaccinator for Higham Ferrers from 1879 – 1913 was Dr John Crew. He was also the Medical Officer of Health for the Wellingborough Union, thus appearing to maintain the link with the Poor Law.

The Guardians had to provide a venue for vaccinations to take place and, as this could not be the Public Vaccinator's surgery except in exceptional circumstances, public vaccination stations were set up, often in inappropriate venues such as public houses (Durbach 2000). In rural districts the Guardians were also empowered to arrange for the Public Vaccinator to visit less often than the statutory calendar; in many cases only twice a year. This meant that the age at vaccination of infants born in rural areas depended on the month of birth - much more so than in the urban areas where sessions were held on a much more frequent basis (Greenwood 1901).

Under the terms of the 1871 Act, a Vaccination Officer was also appointed to undertake the administrative duties related to vaccination, apart from that of serving notice of vaccination, which the Registrar continued to do at the time of registration of the birth (Drake 1997). The Vaccination Officer compiled infant birth registers based on information supplied by the Registrar and the Public Vaccinator.[6] It is these registers that form the primary source of information for this study. They provide detailed information at the level of the individual infant and include date and generally place of birth, name and gender of child, name and occupation of father, date of death if this occurred before vaccination and vaccination history. Vaccination history included date of notification, person to whom notification was given (i.e. the person who registered the birth), date of vaccination and outcome of vaccination which could be:

a) successful vaccination;
b) postponement for a period of up to two months due to poor health;
c) insusceptibility, but only when the child had been unsuccessfully vaccinated three times (Greenwood 1901).[7]

If the child had had smallpox this was also recorded. Finally the names of the vaccinator and the Registrar were also included (Appendix 2). As the Vaccination Officer had to make every effort to have children vaccinated, infants who moved out of the district were also on occasions followed up and the date and place of vaccination and name of vaccinator were entered in the register (Simon 1872). This was not comprehensive however and the lack of a vaccination record did not mean that the child had not been vaccinated, as not all children who left the sub-district could be traced. The format of the registers changed following the revisions of the 1898 Act to include information on conscientious objection. Conscientious objection was introduced in 1898 as a result of widespread non-compliance with the 1871 Act, as smallpox epidemics lessened and as the anti-vaccination lobby gained ground. This, according to Greenwood, was due to *" the determined opposition of a comparatively small portion of the community, who lost no opportunity of traducing the principles of vaccination, and of dragging into publicity, and exaggerating, every accident that occurred in the working of the law..... popular opinion was slowly undermined and increasing difficulties arose in carrying out the law."* (Greenwood 1901:40). In particular, Greenwood attributes the success of the anti-vaccination campaign to a small group of protesters who were able to infiltrate the Board

[6] The vaccination Officer for the Higham Ferrers sub-district for the period studied from 1879 – 1909 was a Mr George Turner.

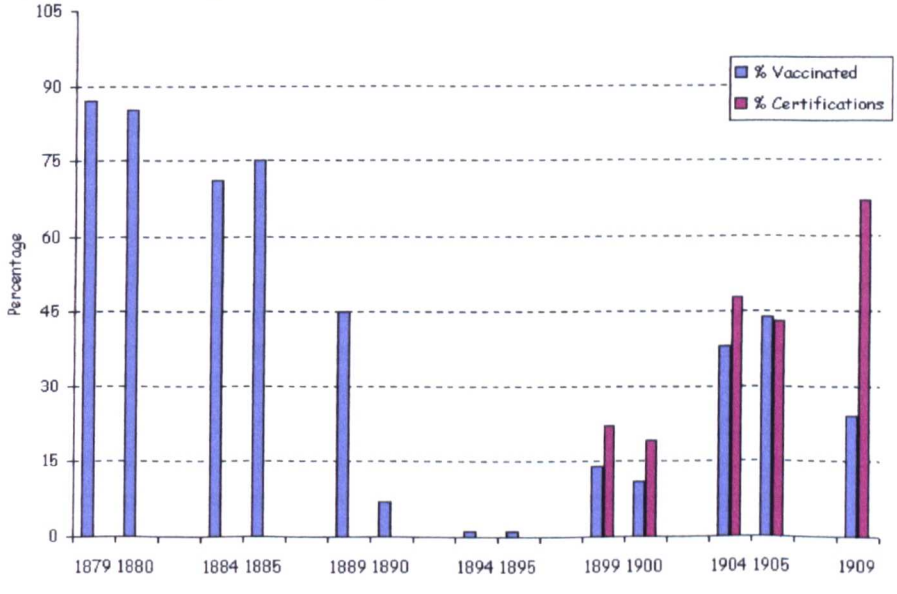
7 The vaccination process was deemed to have 'failed' if there was no reaction to the vaccine or development of a vesicle (Roitt 1988). If this happened on three occasions with the smallpox vaccine, then the infant was said to not be susceptible to treatment and a certificate of insusceptibility was issued (Greenwood 1901).

of Guardians - the overseers of the system. He adds: "*As all prosecutions were thought to require the consent of the Guardians, the latter were practically able to paralyse the existing law.*" (Greenwood 1901:40).

The percentage of infants vaccinated in Higham Ferrers fell from 90% in 1880 to less than 1% in 1894 and there seems little doubt that the Wellingborough Board of Guardians was an influential factor (Figure 3:1). For example they refused, for two years in the late 1890s, to appoint a Vaccination Officer when the post became vacant; only doing so when threatened with legal action (*Wellingborough News* February 1899). Durbach (2000) also contends that the anti-vaccination movement was primarily instigated by working men, in part reacting to draconian measures introduced by employers to force the working classes to comply with the Act. She indicates that the movement was strongest in areas where there were active labour movements, which may have been the case in Higham Ferrers (Greenall 2000). Although there was no evidence of anti-vaccinationist activity in the sub-district, there were examples within Northamptonshire, such as the Anti- Compulsory Vaccination Society in Long Buckby, (another shoemaking centre) which was set up in 1897 to assist members in defying the law, by paying the fines of defaulters (Lilly 1993).

As a result of the national high level of non-compliance with the previous Acts, a Royal Commission was set up in 1889 to investigate the issues. It published its final report in 1896 after 136 sittings and having interviewed 187 witnesses (Greenwood 1901). In consequence of this report, the 1898 Vaccination Act was introduced. Many revisions were made to the previous Act including the recommendation for the use of animal lymph instead of the previously used human lymph - a major issue for the anti-vaccination campaigners (Greenwood 1901).

Figure 3:1 *Percentage of infants receiving vaccination or certificate of exemption in Higham Ferrers for selected years 1879-1909*



Source: CVRs

The new Act also recommended that the time allowed for vaccination be increased from three to six months.[8] Public vaccination stations were abolished in favour of the vaccinator

[8] The introduction of these regulations increased the mean age for vaccination and therefore meant that for the first years following the Act, infant deaths occurring at later ages were also recorded; an important factor in the analysis of infant mortality.

visiting the child in his or her home, for which the vaccinator would be paid five shillings. Finally the penalty for non-compliance with the regulations could not be repeated until the child was four years of age (Greenwood 1901). The major concession to the anti-vaccination element however was the introduction of a conscientious objection clause, which allowed parents to obtain a certificate of exemption from a stipendiary magistrate stating their belief *"that it* [vaccination] *would be prejudicial to the child's health"* (Greenwood 1901:42).

Whilst these new regulations improved the uptake of vaccination initially, they did not appease the anti-vaccination lobby and parents were urged to continue to break the law by refusing to apply for a certificate of exemption from the magistrate's court. After an initial period of compliance the effect of the Act on levels of vaccinations was limited, which, according to Greenwood, was due to the fact that *"many of the Boards of Guardians throughout the country are still controlled by the anti-vaccinationist element*, [and so] *the action of the Vaccination Officers in prosecuting offenders is largely paralyzed"*, (Greenwood 1901:53).

The Local Board took some measures to overrule the Boards of Guardians, such as giving Vaccination Officers the right to initiate prosecutions without the sanction of the Guardians. This was confirmed by law in the case of *Bramble v Lowe*. Later an Eastbourne Magistrates' Court also successfully sued a Board of Guardians for the loss of income from fines from prosecutions (Greenwood 1901).

The anti-vaccination campaign continued unabated until 1907, when a further amendment to the 1898 Act reformed the conscientious objection clause such that only a statutory declaration was required instead of external arbitration by the Magistrate (Durbach 2000). By 1939 only about 34% of the nation's children were vaccinated, although vaccination was still compulsory and remained so until the introduction of the National Health Service in 1948 (Baxby 1999).[9] After a further series of global campaigns aimed at eradicating the infection, the last naturally acquired cases occurred in Somalia in 1978 and the World Health Organisation finally declared smallpox to be extinct in 1980 (Walsh 2002).[10]
The vaccination birth registers for Higham Ferrers are available at the Northampton Record Office (NRO) for the years 1879 - 1910 with the exception of 1897, which is missing (Vaccination Birth Registers NRO PL/12 378 - 403). The register for 1897 also included information related to births and deaths of infants born in 1896 and therefore caused a significant gap in the information for these years. The vaccination birth register for 1910 was also incomplete. In common with those found elsewhere, the registers, based on information derived from the Registrar for Births and Deaths, provided information at parish level of all births that occurred in the sub-district. Analysis at street level in Higham Ferrers was not possible, because in most cases during the 19th century the full address was not included in the registers. In the 20th century, street names were included for Rushden and occasionally the other towns, but not consistently.

Evidence from the Higham Ferrers' registers indicates that they remained working documents for a long period of time, with information about vaccination being added to the record many years after the original entry.[11] As the 1898 Vaccination Act took effect, it

[9] See Chapter 7 for a fuller discussion of these issues related to the impact of vaccination in Higham Ferrers
[10] According to a WHO report, a variant of smallpox – Human Monkeypox – was seen in Zaire with 500 cases reported between 1996 and 1997. The infection is readily transferred through person-to-person contact and many of the people infected had already been vaccinated against smallpox
[11] For example Lily Garley from Rushden born in 1889 was vaccinated in 1912 aged 22 years.

would appear that an audit or survey of those not vaccinated was also carried out, presumably to encourage vaccination. In the comment column for each non-vaccinated child, there is a cross or a comment such as 'gone', 'dead' or 'died away' and occasionally a date and comment indicating that notification had been posted - sometimes to other towns such as Wellingborough or Kettering. The audit appears to have taken place between November 1898 and mid-December 1898, as the date on which the record was reviewed is included in red. There is no further information and similar dates have not been found in the registers of other sub-districts reviewed by other members of the OU project on infant mortality. The dates and comments therefore, can only be viewed as a point of interest and speculation.

The vaccination birth registers also included information on infant deaths, if death occurred before vaccination. Normally when death occurred after the vaccination had been carried out, this was not recorded because the purpose for which the record was kept had been achieved with vaccination. However, in Higham Ferrers the Vaccination Officer appeared to observe children who had been vaccinated, as well as those who were not, and where death occurred after vaccination but before the infant's first birthday, it was logged in the vaccination record. The recording of these deaths appears however to have been inconsistent, especially early in the period studied when the proportion of infants vaccinated was high. The accuracy of the infant death information ranged from 76% of all infant deaths being recorded in the VBRs of 1880, to 100% for the years at the end of the 1880s and early 1890s.[12] This source of information on infant deaths occurring after vaccination was therefore potentially unreliable when unsupported by additional information from the infant death registers. The VBRs did however provide accurate records for neonatal death as vaccination normally took place after the first month.

3.3 Infant Death Registers (IDRs)

The infant death registers were compiled monthly from information provided by the Registrar and gave information on all infant deaths occurring under the age of 12 months. The registers were available for Higham Ferrers for the years 1871 - 1893 and provided much the same socio-biographical information as that seen in the VBRs i.e. date and place of birth, name of child and father, father's occupation and birth registration number. In addition, details of death were included such as date of death, age at death and death registration number, but not cause of death information. The inclusion of birth and death registration numbers made it possible to link entries in both types of register and thus gain a fuller, more accurate account of the infant experience. This was of particular importance when considering infant deaths, since neither register on its own was sufficiently accurate to provide a comprehensive account. In the majority of cases, all registered infant deaths were recorded in both the VBRs and in the IDRs, but the omission of some deaths in the VBRs is illustrated well by the data collected from both types of registers for the decade 1880 to 1889 (Table 3:1). The Vaccination Officer was aware of all registered deaths from the Returns of Deaths of infants under 12 months, but why he chose to include some, but not others is unclear.

During the period from 1880 –1889, 20% (110) of the infants died after having been vaccinated and of these deaths, only 53% (58) were recorded in the VBRs. The majority of omissions occurred in the years when vaccination rates were high but as the number of infants being vaccinated declined, the reliability of the additional information improved

[12] Assessment of the accuracy of the data was through comparison with the infant death registers which were only available for the area until 1893

(Table 3:1).

Table 3:1 *A comparison of annual infant deaths recorded in the Vaccination Birth (VBRs) and Infant Death registers (IDRs) for Higham Ferrers 1880 - 1889*

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
Deaths										
IDRs	46	50	54	39	57	44	57	59	60	77
VBRs	35	40	45	32	51	40	48	59	60	77
Difference in number of deaths	11	10	9	7	6	4	9	0	0	0
% Infants Vaccinated	90.2	87	79.5	81.8	73.6	78.9	74.1	68.2	60	48.1

Source: VBRs &IDRs

This makes any assumptions about infant mortality potentially unreliable, if based solely on the vaccination birth registers, especially in the early years of the period studied. The problem of inaccuracy in the vaccination birth registers seems to disappear after 1886, but as the infant death registers are only available until 1893 to confirm the accuracy of the birth registers data, later data needs to be viewed with caution.[13] Investigation of VBRs other than those in this present study indicates that inclusion of death information post-vaccination was most unusual, but it adds to the value of the Higham Ferrers registers and in times of low vaccination uptake provides a reasonably robust database from which to examine patterns of infant mortality.

When considering infant cohorts, both registers present the problem of 'extra' deaths. The vaccination birth registers included infants who died outside the sub-district and in some cases, those who died after their first birthday (Table 3:2).

Table 3:2 *'Extra' infant deaths recorded in the Vaccination Birth (VBRs) and Infant Death registers (IDRs) for Higham Ferrers 1880 - 1889*

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
VBRs										
Deaths occurring outside the sub-district	1	1	2	0	1	3	1	0	0	6
Deaths post 1 year	1	3	1	1	1	0	1	1	0	1
Deaths not recorded in infant death registers [i]	0	0	1	0	0	1	0	0	0	1
IDRs										
Deaths of infants born outside the sub-district	5	2	9	5	1	7	3	4	2	2
Deaths of Infants not registered	1	0	0	1	0	0	0	0	0	0

i As these deaths are not included in the infant death registers, it would seem likely that death occurred outside the sub-district, particularly as the infant death registers based on information from the Registrar have been seen to be more accurate.

Source: VBRs and IDRs

[13] The percentage of infants vaccinated during the 1890s was approximately 5% (Figure 3:1)

Similarly, the infant death registers included deaths of infants who were born outside the area and therefore there was no record of the birth in Higham Ferrers VBRs (Table 3:2). In all cases, these additional deaths were excluded from the study, because the infants had experienced an alternative environment, which could not be studied and the death could not be confirmed by reference to the other register.
Despite these anomalies, the accuracy of the data can be demonstrated through comparison with the Registrar Generals' data for the sub-district for the period 1880 to 1889. This indicates that most deaths were 'captured' when the vaccination birth registers and the infant death registers are combined (Table 3:3).

Table 3:3 *A comparison of annual births and infant deaths recorded by the Registrar General (Reg-Gen) with those of the Vaccination Officer (VBR /IDR) for Higham Ferrers for the years 1880 to 1889*

	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
Births										
Reg – Gen	356	409	446	447	450	438	469	507	487	553
VBR / IDR [i]	356	409	441	447	440	438	470	507	485	552
Difference	0	0	5	0	10	0	-1	0	2	1
Deaths										
Reg – Gen	60	45	60	55	50	50	66	50	64	78
VBR / IDR	60	45	60	52	49	50	66	50	66	73
Difference	0	0	0	3	1	0	0	0	-2	5[ii]

[i] The deaths and births in common with data from the Registrar General are for a calendar year not for a cohort as in the previous tables
[ii] The discrepancy in deaths in 1889 may have resulted from a transcription error since the printed figures 8 and 3 were very similar

Source: Registrar Generals' Quarterly reports & VBRs and IDRs

The years, where the largest discrepancies occurred in the number of births, were those of 1882 and 1884 and for deaths, the years 1883 and 1889. The reason for the discrepancies in births is unclear, because during the 1880s notification of the need to have the child vaccinated was given at the time of registration of the birth and the vaccination registers should mirror the Register of Births. However, if death occurred at birth or around birth, it may have been thought unnecessary to include the infant in the vaccination birth register. There is however no evidence of this happening and the birth registration numbers are sequential in the VBRs, indicating that there were no 'gaps'. In fact, in 1884 there were 6 infants whose parents were not given notification of vaccination, presumably because the birth and death of their infant were registered simultaneously, but the birth and death of their infants were still recorded in the vaccination birth registers and the infant death registers.
The information about infant deaths was copied from the register of births and deaths and therefore the information was readily available. Unlike the birth registration numbers, those in the infant death registers are not sequential, because deaths at all ages were included and it is therefore not possible to confirm the accuracy of the information.

Whilst it is possible to explain why fewer births and deaths were recorded in the vaccination registers than in the Registrar Generals' data, the reason for there being an extra birth in 1886 and two extra deaths in 1888 in the vaccination registers, is unclear. One possible explanation is that the figures published by the Registrar General were inaccurate, but without the raw data this would be impossible to confirm.

The smallpox vaccination birth and infant death registers in the Northampton Record Office are original and not copies and were produced at the time by the Vaccination Officer in accordance with the related Acts of Parliament. In general they are legible and easy to use. Because they were produced at the time and were working documents with the information transcribed from official documents - the Register of Births and Deaths- they were not generally affected by the passing of time or poor memory. However the fact that the information was transcribed initially and then again for this current study does inevitably increase the potential for inaccuracies to occur. The registers were originally compiled on a monthly basis on loose-leaf sheets, which were bound at the end of each year (Simon 1872). Each volume therefore spans parts of two years and in most cases records information from November one year to October/ November the following, depending on how soon parents registered the birth. For the purposes of this study the data was collected on a calendar year basis rather than by individual vaccination birth registers. Data was initially collected from the infant birth registers for the years 1879 / 1880; 1884 / 1885; 1889 / 1890; 1894 / 1895; 1899 / 1900; 1904 / 1905 and 1909 / 1910 giving a spread across the period under study. Collecting data from pairs of consecutive years, allowed for data to be combined, facilitating analysis, which was particularly important when analysing data for the rural parishes or occupational groups, where the numbers of births were very small.[14]

When analysis of pairs of consecutive years was made, the data for 1909 was not included, because the record for 1910 was incomplete and that for 1909 included the parishes that had formerly belonged to the Earls Barton sub-district. As a result, the compiled Excel database contained the details of 6693 infants; 713 of whom died before their first birthday. For each infant the record contained the following information:- a unique reference number; number in birth register; infant's name; father's name (or mother's in the case of illegitimate infants); dates of birth, notification and death; place of birth; gender; father's occupation; vaccinator and the person to whom notification was given.

Similar data was also collected for the other years between 1880 and 1889 - a period when both the vaccination birth registers and the infant death registers were available. This provided information on 4547 infants born in consecutive years and an opportunity therefore to study the experience of cohorts of infants.

In transcribing the data, various strategies were adopted to ensure that the information was treated in a consistent manner. The information was transcribed by hand onto pre-printed sheets and entered on a database using a standard format in an Excel programme. The initial data transcribed did not include names, other than those of dead infants, which was found to be a serious omission when linking family groups. The process of returning to the original data for names, although time consuming, proved of value, however, in checking the accuracy of the transcription.

Lastly the infant death registers from 1874 to 1893 were also transcribed and the information from the infant death registers was checked against the data from the vaccination birth registers. Where information about an infant death was found to be missing from the vaccinations birth registers, it was added to the infant's record. In this

[14] It would have been of value to obtain data for all years under study by the OU project group from 1879 – 1910, but this was not possible. The vaccination birth register covering 1897 was missing and with it, information from 1896. The use of pairs of years, overcame this problem by only using selected years at regular intervals, avoiding the missing years. For the most part however this study has concentrated on the years 1880 – 1889, a time of intense activity in shoemaking and in Rushden.

way a new data set was compiled, which included that from both the vaccination birth registers and the infant death registers. For the remainder of this study, it was this database that was used and the combined data set will hereafter be known as the 'combined vaccination registers' (CVRs) to distinguish it from the vaccination birth registers (VBRs) and the infant death registers (IDRs). On the occasions when data from one type of register is used rather than the combined version, then the terms vaccination birth registers or infant death register are used.

The CVRs represented an excellent source of data for the period under study, but as Holmes (1997:31) indicates *"what counts as relevant data is historically and culturally embedded: it is a matter of interpretation"*. The data found in the registers appears 'factual' especially in relation to dates, birth and death registration numbers and place of birth and can be verified using other sources. However, to present the data as found or as Cushing (1995) comments *"to let the data speak for itself"* is of little value in the context of historical research. Interpretation of the data is required if the historian is to use the data in such a way that it assumes meaning and significance (Holmes 1997). Indeed it could be argued that interpretation of the data occurs at first sight by anyone reading it. The task of the historian is that of critical meaningful analysis, whilst using the data to hypothesise and to develop explanations of the past. This is particularly true of qualitative data, but even the 'hard facts' found in the CVRs are themselves open to interpretation.

As they stand in their original form, little information can be gained to add to the debate on infant mortality beyond the numerical information (even this may be subject to discrepancy as has been seen in the recording of dates when infants are vaccinated before they were born!). To examine the social, environmental, economic and cultural influences on infant mortality in this study, the data was interpreted and in doing so a unique '*story*' was formed. For the research to be valid it is essential that the steps taken to sort, catalogue, include and exclude data are explicit, consistent and open to examination and replication. The results of this process are not definitive and remain open to alternative interpretations. To provide consistency, however, the transcribed data (once copied) were 'corrected' and interpreted in the following ways:

- Where the date of vaccination occurred before the date of birth or more than two weeks before the date of notification of birth, the vaccination year was changed to the following year. It was recognised that this may be incorrect for some infants, but for the majority this change meant that the interval between birth and vaccination, became similar to that for other infants born around the same period.
- Where information in the death register was different to that in the birth register the former information was recorded. Again this was recognised to be a problem in that the circumstances of the infant's birth were as important as the post-natal experience. However, as the infant had died, information current at the time of death was thought to be more important for analysis. The birth information was recorded in a separate column.
- Where there was evidence that the infant had left the area because a) 'gone away' or a similar comment was found in the comments column, or b) the infant had been vaccinated by a vaccinator unknown in the sub-district, then the last date when a firm sighting was recorded, (usually the date the birth was notified), was used to calculate the length of time the infant was known to have survived.
- Deaths of infants who died away (determined by the absence of a record in the infant death registers) were not included in the deaths recorded, because the postnatal influences, which may have caused death, could not be studied. Their births were recorded however and the infants were treated in the same way as other infants who moved away.

- Infants were classed as illegitimate when a female name was entered in the parent column in the registers and/or when the occupation listed was also female e.g. lace-maker / housekeeper. For the majority of infants this may have been an accurate reflection of legal status, but it may also have applied to children of widows and those whose husbands were living apart from the family. In all cases however the effect on the infant experience was likely to have been similar and it was therefore seen as reasonable to use this term.
- Information about children born outside the area was found only in the death registers. Such children were not included in this study because place of birth may be a contributory factor in infant mortality and for those born outside the sub-district the influences may have been different.
- Names were changed when there seemed reasonable evidence that the original spelling was incorrect especially in family groupings -where doubt remained the original spelling was retained. The same strategy was applied to dates when it was obvious that an error had been made e.g. giving the wrong year date in January for example.
- It was not possible to identify social class from the occupations, since terms such as 'shoemaker' are generic and prior to the mid 1880s used for shoe manufacturers as well as shoe workers, and therefore give little indication of income or social status. When using the CVRs and the CEBs in combination it was also seen that some men changed their occupation. Occupations were therefore grouped into five categories: shoemaking, agriculture, ironstone mining, railway workers, and others. Although not based on a formal categorisation system these categories were of value because different parishes in the sub-district were associated with different industries and the grouping also allowed for a discussion to be developed about the impact of shoemaking on the infant experience.[15]

By interpreting the data in this way, the CVRs provided a valuable record of the infant experience at local level, particularly when the birth and death registers could be used in combination. Data provided by CVRs was of especial value in determining infant mortality rate differences in the individual towns and villages making up the study area – information not readily available from other sources. From the data, analysis of urban / rural differences in infant survival rates was possible and in addition, comparison of the infant mortality experience in Rushden with that of the other parishes in the sub-district that experienced less rapid population growth. The impact of industrialisation of the shoe industry on the infant mortality experience could also be explored, through identification of differences within occupational groups. Data was also available through the registers to explore individual characteristics of those infants who died, such as age at death and the seasonality of death. Examination of the experience of mortality among twin sets and among those born to single mothers was also possible using the CVRs. In conclusion the CVRs for Higham Ferrers provide a valuable tool in the study of infant mortality at the local level and as Drake (2005:52) concludes "*They are unrivalled for the purpose and will continue to be so until the civil registers of births and deaths are made freely available*".

3.4 Census Enumerators Books

For the more detailed exploration of infant mortality in Higham Ferrers between 1881 and 1889, the information from the CVRs was supplemented with that from other sources, including from the censuses. The census reports of 1881, 1891 and 1901 were used to provide information on population numbers and numbers of inhabited houses, but the main

[15] Rushden - shoemaking; Irthlingborough – ironstone mining; Wymington – railway; rural parishes – agriculture.

sources used for the towns and villages in Higham Ferrers were the census enumerator's books (CEBs). Censuses were usually taken in March / April every ten years from 1801, and from 1841 are a valuable source of information giving data about each house and its inhabitants such as their age, relationship, occupation and place of birth.

The 1881 and 1891 CEBs for Higham Ferrers were found at the Northamptonshire Record Office (NRO) on microfiche and these and the 1901 census information were also accessed via Ancestry.com. In addition the census for 1881 was available on a set of CD ROMs produced by The Church of Latter- Day Saints (1999).[16] The CEBs on microfiche for the parishes of Higham Ferrers for 1891 were photocopied and key information was entered on an Excel database. For the majority of the parishes, the CEBs were clear and easy to read, but that for Rushden had 6 pages that could not be deciphered. This meant that there were gaps in the information and limited the number of infants born between 1880 and 1889 who could be observed in 1891.

3:5 Database of infants births and deaths in Higham Ferrers between 1880 and 1889
All households listed in the 1891 CEBs for Higham Ferrers were searched for children born after 1880. These were matched with the 4003 children listed on the 1880 - 1889 CVR database who had survived infancy. Matches were found for 3083 infants and the additional information, such as details of maternal year of birth, place of parents' birth and parental occupation, were then added to the database. From this information it was also possible to group together infants into 1417 family groups or units.

A further 352 infants who had died during infancy were placed within these family groups, because place of birth, fathers' name and occupation matched those in the CVR and the dates of birth were feasible when all siblings within the group were considered. In addition 33 sets of parents in the sub-district, whose only child was born and died before their first birthday, were also located in the 1891 census by matching similar information from the CVRs. It was not possible to confirm with complete certainty the parental link without recourse to the birth and death certificates, which was outside the scope of this study, however, where there was any element of doubt the link was not made. Using this information from the CVRs and from the 1891 CEBs, a database was compiled of 1450 family units containing 3468 (76 %) of the infants born between January 1880 and December 1889. Children found in the 1891 CEBs who were not listed on the CVR database were omitted from the study, because they were born outside the sub-district and therefore experienced alternative conditions during infancy.

The parents of the 1079 infants who were not located in the 1891 CEBs were then searched for in the 1881 CEBs. From this search a potential further 332 infants (281 surviving to first birthday and 51 who died during infancy) were matched by using place of birth information and parental details. To confirm the match the parents were searched for in the 1891 CEBs outside Higham Ferrers using Ancestry.com. As a result the details for a further 228 infants for whom a positive match were found were added to the database. Of the 716 infants not found in either the 1881 or 1891 CEBs for Higham Ferrers, a further 54 infants, or their family unit, were also located outside the sub-district in 1891 and their details added to the database for 1880 – 1889.

This database, when completed, contained information for 3753 (83%) infants; 3341 (84%)

[16] The 1881 census for the Higham Ferrers sub-district was also accessed from the Data Archive at the University of Essex, but the data for Northamptonshire was found to be incomplete and was not used.

surviving to 1st birthday and 412 (76%) dying before first birthday. They were located within 1598 family units (Table 3:4).

Table 3:4 *Infants born between January 1880 and December 1889 in Higham Ferrers (HF), and/or their family unit, observed in the 1881 and 1891 CEBs.*

Family Units	All infants	Infants surviving to 1 year	Infants dying before 1 year	Family Units
Observed in 1891 HF CEBs	3468	3083	385	1450
Observed in 1881 HF CEBs and outside HF in 1891	228	204	24	109
Only observed in 1891 CEBs outside HF	57	54	3	39
Total infants recorded in CVRs observed in 1891 CEBs	3753	3341	412	1598
Infants not observed in any 1891 CEBs	794	662	132	629
Totals infants	4547	4003	544	2227

Source: CVRs & 1881and 1891CEBs

In common with all CEBs, there were many errors and the information needed to be interpreted. On occasions the spelling of surnames presented a particular problem because it varied, not only between the CEBs, but also between the CEBs and the vaccination registers. However, in the majority of cases it was possible to identify the person/s as being the same. Where there was an element of doubt, then the data was left unchanged and the infants were allocated to a separate 'family' group. This had the effect of increasing the number of 'transients', a group of individuals who were found in neither the 1881 or 1891 CEBs.[17]

Similar problems were encountered with occupation, particularly in relation to shoemaking. The men identified in the CEBs as working in the shoe industry were given either a generic title such as shoemaker, shoe manufacturer, shoe worker or an actual job title such as riveter, finisher, machinist, clicker etc. The description often changed between the 1881 and 1891 CEBs and on occasions differed from that in the CVRs. In general men stayed in the same type of occupation, but on occasions changed their occupation completely. One of the most common changes was that from agricultural labourer to shoemaker; such a change being usually supported by information from the CVRs. Where it was clear that the man was the same person, then the occupation in 1891 was taken as the standard for the data. This changing occupation made it difficult however to analyse the role of social status on the infant experience within this study, but it was possible to explore the impact of shoemaking as an industry on infant mortality patterns.

In summary, therefore, the main quantitative sources available for the study of infant mortality in Higham Ferrers were the Registrar Generals' quarterly returns, the smallpox vaccination registers and the infant death registers and the 1881, 1891 and 1901 CEBs for

[17] This will be discussed in more detail in Chapters 7, 8 and 9 when this information is used in the analysis of infant mortality.

the sub-district. These provided comprehensive data for the exploration of infant mortality in Higham Ferrers at the local level. When used in combination as for the years 1880 – 1889 it was possible to examine the characteristics of families into which infants were born and identify the influence on infant mortality of issues such as migration, socio-economic status from occupation of head of household, family size and birth order, maternal age and occupation as well as the effect of gender, illegitimacy and multiple births on infant mortality rates. As the data includes actual dates of birth and death age specific infant mortality could be explored as well as seasonality.

3.6 Calculation of Infant Mortality Rate

For the data from either the Registrar Generals' quarterly reports or the CVRs to be of value, conversion to a form which allows meaningful interpretation is necessary. For the purpose of this study, infant mortality rate (IMR) was used throughout and can be defined as the number of infants per 1000 live births who died before their first birthday.
How the IMR is calculated and what it refers to is determined by the type of data available and it is therefore essential that the nature of the data is clearly identifiable, because as indicated by the Registrar General in 1886, "*It is useless to shut our eyes to the imperfections of our records. To be without trustworthy means of comparison is doubtlessly an evil, but to ignore the difficulties and deal with the records as thoroughly reliable would be still worse, for it is far better to be without statistics at all than to be misled by false ones*" (cited in Mooney 1994).

The method of calculating IMR was chosen according to the purpose required. For this study, three methods of estimating IMR were considered: a) Standard IMR, b) Cohort IMR and c) Individual- based cohort IMR.[18] Each of these methods has benefits and disadvantages, which needed to be recognised.

3.6.1 Standard IMR

Standard IMR represents the number of infant deaths per 1000 live births for each calendar year and can be calculated using data from the Registrar General (Table 3:5). There is no expressed link between the babies born and those who died, and the birth or death is counted for the year of registration. This does not impact on the validity of the calculation of standard IMR, but as the legal requirement during the period studied, was for registration to take place within 42 days of the birth, some births in late November or December of one year might be added to the data of the following year. The same is true for infant deaths, although in general the period elapsing between death and notification was significantly less (Newell 1988).
This discrepancy between actual dates and registration dates has the potential to increase IMR for a particular year, if the number of deaths at the end of that year which are added to the data for the following year, is less than the number of births 'moved'. Using the data from the vaccination registers overcomes this problem, because the actual dates of birth and death are known, but the available range of vaccination registers is limited and inconsistent across the country and therefore potentially less useful in making comparisons with other areas, than the Registrar Generals' data.[19]

[18] This is not actually an additional method but really an extension of the previous cohort method based on the concept of multi- decrement life tables. It has been described separately and called individual based cohort IMR for the purposes of this study in order to clarify the discussion.
[19] According to Drake (2005) only 5% of the VBRs and 1% of IDRs have so far been located, although it may be that others will be found.

Table 3:5 *Standard Infant mortality rate (IMR) for the years 1880 – 1884 for Higham Ferrers*

	1880	1881	1882	1883	1884
1 A G E 0	Deaths 60 Births 356	Deaths 45 Births 409	Deaths 60 Births 446	Deaths 55 Births 447	Deaths 50 Births 450
IMR	168.54	110.02	134.53	123.04	111.11

Source: Registrar Generals' Quarterly reports, 1880 – 1884

A second concern, when using the data from the Registrar General in calculating standard IMR, is that it is not possible to account for the impact of migration on the data. The death data may include infants who move into the area and subsequently die before their first birthday, but will not include the deaths of any infants born in the area, who subsequently move out. In areas where migration is low, the impact on the resulting IMR will be minimal but in areas of high migration this may invalidate the use of standard IMR (Hinde 1998). When using the CVRs to calculate standard IMR, 'in-migrant' infant deaths are identifiable because the infant's birth will not be listed in the vaccination birth registers. As with the Registrar Generals' data, however, it is not possible to identify when infants move out of the area. Despite these areas of concern, standard IMR can be a useful tool, providing it is accepted that the IMR derived is only an indicator of mortality patterns. Whilst the IMR for individual years may not truly represent what is happening in each year, particularly where migration impacts on the death data, it does provide an overall view of the general trends in infant mortality and allows for comparison to be made with other areas where the same type of data is available.

3.6.2 Cohort IMR

Cohort IMR is another useful tool to interpret data and provides a mechanism for analysing infant mortality. Unlike standard IMR, it is based on a cohort of infants during a specified period, with deaths less than 1 year linked to the infants born in the cohort. The identified cohort need not all be born within a particular calendar year - although in general this study does use such cohorts. In order to estimate cohort IMR, it is essential that the data include actual dates of birth and death, such as that provided by the CVRs. It is not possible for this reason to use the Registrar Generals' data for calculating cohort IMR.

As can be seen from Table 3:6, the cohort IMR for Higham Ferrers varied little in the five years from 1880 - 1884, apart from that for the cohort born in 1883, for whom the IMR was below 90 deaths per 1000 live births. However the cohort rate may vary significantly from the standard IMR as in this example, indicating clearly the need for the type of data and calculation used to be made explicit. When all the appropriate data is available, such as in the period from 1879 – 1893 in Higham Ferrers, cohort IMR is a valuable tool in the exploration of infant mortality within and between groups of infants, because birth and deaths are directly related. However, as discussed earlier when only the vaccination birth registers are available the information related to infant deaths may potentially be inaccurate. The exception to this is the calculation of cohort neonatal mortality, because as vaccination took place after the first month after birth and as the vaccination officer

observed infants until vaccination, the number of neonatal deaths 'missing' from the vaccination birth registers, is likely to be minimal (Drake 2005).

Table 3:6. *Cohort Infant Mortality rate (IMR) for the years 1880 – 1884 in Higham Ferrers*

Year	1880	1881	1882	1883	1884
DEATHS[i]	24 / 36	10 / 34	16 / 34	20 / 29	10 / 38
Births	356	414	440	444	439
Deaths	46	50	54	39	57[ii]
Cohort IMR	129.21	120.77	122.73	87.84	129.84
Standard IMR	168.54[iii]	110.02	134.53	123.04	111.11

[i] These are cohort deaths which have been observed in the vaccination registers
[ii] This figure included the deaths of 19 infants who died in 1885
iii This rate is high due to the large number of infants born in 1879 who died in 1880.

Source: CVRs

In Higham Ferrers, for example, during the period from 1880 – 1890, only 2 of the 192 neonatal deaths (1%) were not listed in the vaccination birth registers (identified from the infant death registers), and therefore it was considered reasonable to use neonatal cohort analysis, despite the lack of infant death registers.

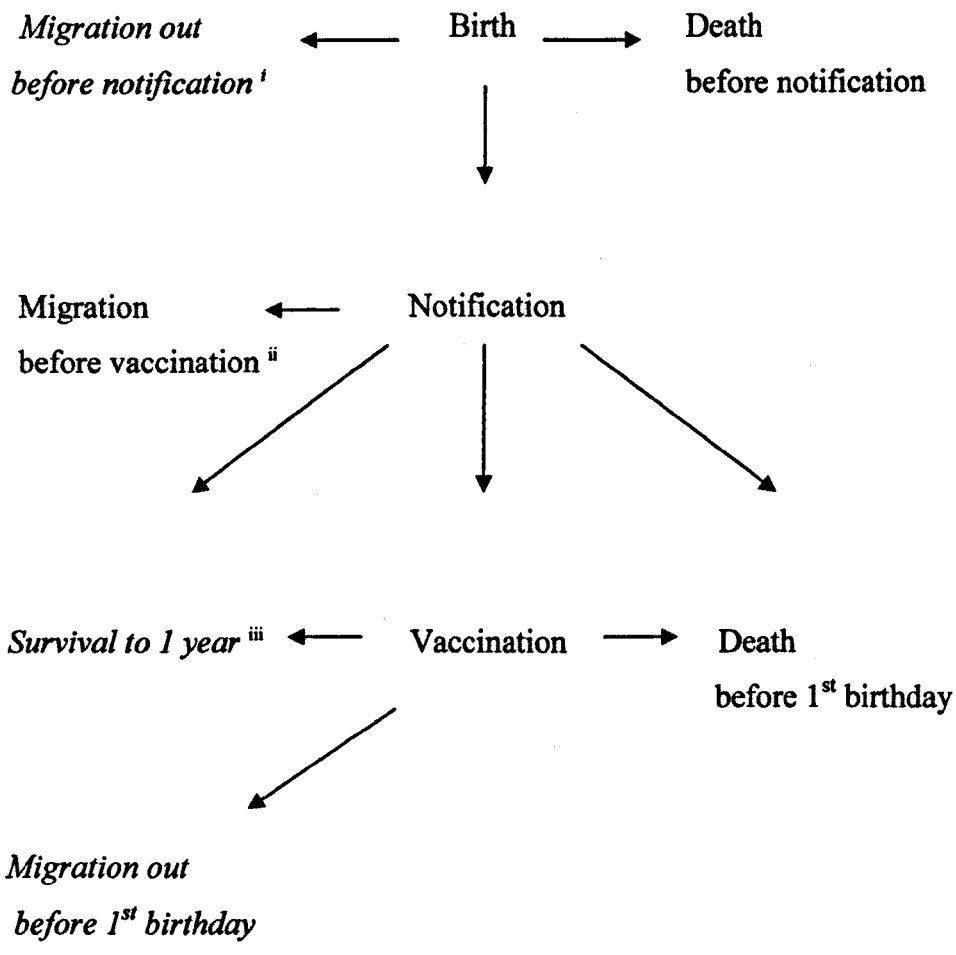
In this study therefore, cohort IMR has been used for an in-depth exploration of the period 1880 – 1889 and in calculating neonatal mortality. Cohort IMR has also been used with reservation in Chapter 5, to demonstrate trends in IMR rather than to provide actual rates, because the data at the level of individual parishes are only available from the CVRs.

3.6.3 Individual-based cohort IMR

Both the methods identified above assume that the outcome of the first year experience for infants will be either 'survival to first birthday', or 'death before first birthday' in the place of birth. Whilst in reality this may have been the case for the majority of infants, (some will have migrated before 1st birthday), the CVRs do not provide evidence to support this assumption. Instead the data provides information related to last sighting, which may occur at a variety of points during the infant's first year (Figure 3:2).

When using data from the combined vaccination registers alone, the only 'factual' information available for all infants are date of birth and date of notification. For all vaccinated infants the date of vaccination is included. The date of death is available for those who died either before notification, before vaccination or after vaccination but in all cases before 1st birthday. If the date of death is not provided it can be assumed that the infant survived or migrated out of the area, but it is not possible to identify which from the registers. (Table 3:7).

Figure 3:2 *Multi-state representation of the potential first year experience indicating the states provided by the Vaccination Birth and Infant Death registers*



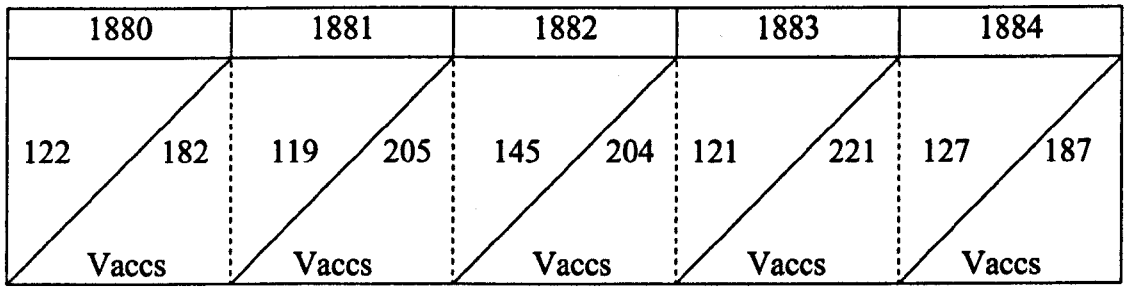
[i] Information about the states identified in italics is not provided by the vaccination birth and infant death registers
[ii] The only evidence provided in the registers of infants migrating out of the sub-district, was information about vaccination outside the area which is sometimes given
[iii] Information about survival to 1st birthday was available from 1891 CEBs

Source: Vaccination and Infant death registers

Only in a very small number of cases is vaccination after migration recorded, but even here, survival to 1st birthday is generally unrecorded. The only infants known to have survived to 1 year are those who can be identified in the CEB following the infant's birth, and/or those who are vaccinated *after* 1 year, where this is recorded in the registers.

Calculation of individual based cohort IMR, addresses this problem of the last observation being before 1st birthday, by removing individual infants from the calculation at the point or state last mentioned in the registers or observed in other data sources. This potentially provides a more accurate assessment of the proportion of infants who will die per 1000 live births than either of the two previous methods. However, as children who remain in view are disproportionately likely to have a death recorded, the IMR at 1 year may be higher than that calculated using other methods (Table 3:7).

Table 3:7 *Individual based cohort IMR for the years 1880 – 1884 in Higham Ferrers*



	1880	1881	1882	1883	1884
Births	356	414	440	444	439
Deaths	46	50	54	39	57 [i]
% Infants vaccinated	87	84	77	80	72 [ii]
% Vaccinations > 90 days	83	81	84	79	81
% Vaccinations >1 year [iii]	3	7	5	2	1
Last noted at notification [iv]	5	14	45	49	65
IMR	277.37	214.50	201.82	163.30	225.82

[i] This figure includes 19 infants who died in 1885
[ii] Includes those infants born in 1884 who were vaccinated in 1885
[iii] In each cohort there were infants who were vaccinated later in childhood or during early adulthood. It is these infants who constitute survivors in this method of calculating IMR. Some infants who died after vaccination appeared in more than one column and were removed at the last sighting (i.e. death), so as to ensure that they are not removed twice or more. Those who did not appear in the vaccination or death columns were removed at notification.
[iv] As the proportion of infants vaccinated decreased, the number of infants 'disappearing' from observation at notification increased

Source: CVRs

Individual cohort IMR is most of use when calculating neonatal mortality rate, because the last sighting of most infants occurs after the first 28 days, at the time of notification (about day 40). When vaccination rates were high, the 90-day mortality rate may also be valid if, as in Higham Ferrers the majority of infants are vaccinated later than the statutory 90-day period (Table 3:7).

Within this study, the choice of method for estimating IMR has been based on the data available and the purpose for which IMR was being used. Standard IMR, based on the Registrar Generals' data, has been used in Chapter 4 to set the exploration of infant mortality in context and to describe patterns and trends in infant mortality in the sub-district over the period studied from 1879 – 1910. It has also been used to compare the infant mortality patterns found in the sub-district with those in the other sub-districts of the Wellingborough District, the district itself, the county and the country as a whole.

The vaccination birth registers for the years 1879 – 1905 and where available, the infant death registers provided data for exploring issues such as infant mortality within individual parishes of the sub-district and neonatal mortality, which were not open to scrutiny using the Registrar Generals' data. Cohort IMR was used instead of standard IMR because births and deaths were linked and therefore provided a more useful tool for analysis of the factors influencing the infant experience. It was recognised, as discussed earlier, that the lack of the infant death registers from 1894 to 1910 potentially impacted adversely on this data, but the rate of vaccination during this period was low and therefore the likelihood of infant deaths not being recorded was less than during periods of high vaccination uptake. Cohort

neonatal mortality was not affected by the lack of infant death registers (Drake 2005).

In the more detailed analysis in the second part of the study, cohort IMR was calculated from the database compiled from the CVRs and supplemented with information from the CEBs, as described earlier, so that only those infants known to have survived to one year or dying before their first birthday were included in the main analysis.

3:7 Tests of Statistical Significance

As well as using IMR as a means of interpreting data, it was also seen as important to subject the findings to statistical analysis to test the significance of the results – especially important when dealing with small numbers. The method of choice for this study was the Chi Square test (X^2) of statistical significance. Chi Square is of use when the data is nominal and can be used with a minimum sample size of 20 (a minimum of 5 in the observed / expected values) (Clifford & Harkin 1997:87). This method is used to determine whether there is a relationship between two different variables and what the probability is that that relationship occurred due to chance (Malim & Birch 1997). If the probability is small, then the results can be accepted with confidence and the difference or relationship seen as significant. The normally accepted measure of statistical significance at which the null hypothesis can be rejected is 5% or less ($p \leq 0.05$).

3.8 Qualitative data sources

The second facet of the study was an exploration of the factors influencing the health of the community in general, as this was thought likely to impact on the health of the infant directly, or indirectly through maternal health. In particular information was sought on the environment in which infants were born and died, as a means of determining, where possible, the effect that industrialisation of the shoe industry and urbanisation of Rushden had on the environment and in turn on the infant experience.

Without doubt the Medical Officer of Health (MOH) reports proved of value in indicating the health status of the community, but to date not all have been found for the relevant years and area covered by this study.[20] The MOH reports were introduced following the Public Health Act, which created a General Board of Health, and in time, Local Boards. Each Local Board was encouraged to appoint a Medical Officer although many did not, or at best appointed an MOH on a temporary basis during an epidemic. MOHs were required to produce reports, which, as Watkin (1975) indicates, proved to be a powerful weapon for the public health reformers as many of them exposed the appalling unsanitary conditions prevalent in towns and villages at the time. For example, in a report dated January 21st 1892 from Thomas the MOH for Higham Ferrers stated that: -

> *'Rushden from the fact of its unreliable and insufficient water supply and its bad drainage is in an insanitary condition. The water is unreliable coming as it does from shallow wells, which contain surface water, and the drains being inadequately ventilated, and only flushed with storm water, allow the sewer gas to escape.... The nuisance in Alfred Street arose from the contents of nineteen closets. The existence of cesspits, overflowing closet pails, privies, and from their being mostly in a defective condition, are a great source of contamination to well water..... Since September there have occurred seventeen cases of typhoid fever which indicate pretty accurately the insanitary state of the village and the impurity of the water; out of eleven wells which I examined I found the water of five bad and unfit for drinking purposes. These*

[20] Those for Rushden in particular, as for much of the other local data, are held by private individuals, are uncatalogued and very difficult to access.

> *cases occurred after a heavy rainy season, probably causing the water in the wells to rise and thus get contaminated by the surface water and contents of overflowing closet pails and ashpit'* (cited in Hall and Harding 1985:261).

Not a particularly good recommendation for the town, or for the efforts of the Local Board! The villages however fared little better as was evident from a report in *Hygiene* magazine by Dr Morris, MOH for the Wellingborough Rural Sanitary Authority, who commented on *"the shocking case of a man, wife and eleven children* [who] *lived in a house that had only one bedroom. In another case a man, wife and five children, the eldest sixteen, slept in one room; and in a third case eight people slept in one room"* (*Hygiene* 1891:352).

In general MOH reports contain a variety of information some of which is standard such as birth and death statistics, epidemics of infectious diseases etc. and other information, which is more local or personalised (Galley 2004). For this reason as Drake (1994) indicates, the reports need to be read with caution, as each individual may have 'pet' issues which he brings to the fore. One particular area for concern is that of mortality statistics, which are variously calculated by MOHs. In Higham Ferrers the method seems often to be based on 'best guess' details in relation to the number of inhabitants.

In addition to the actual reports, mention of them was found in a variety of other sources. Annual reports for 1902 onwards were summarised in the local papers of the time, but have not been found for earlier years. As the reports were summarised, the choice of material to be included was made by the journalist rather than the MOH and may reflect his own particular hobbyhorse. However as they were reported by two and sometimes three different papers, it is possible to have a composite picture of the key issues.

Some snippets of the Annual MOH reports were also found in the Minute Books of the Rushden Urban District Council (RUDC) from 1891, but in general, these detail only the date that a report was given, not its content. There does however seem to have been a continual source of disagreement between the MOH and his employers. His reports, on occasions, were not accepted and he was asked to re-report. Nor was his salary increased in line with that of the sanitary inspector, whose reports were more to the Council's liking. This aspect of the reports demonstrates how primary evidence is often subjective and biased. In 1894 the Bedfordshire villages came under the jurisdiction of the Bedford Rural District Medical Officer and his report book or diary was found in the Bedford Record Office (BRO), but his annual reports have not been located.

A further source of information from Medical Officers on the health of the community was also found in the Rushden Urban District Council (RUDC) Minute Books. On an almost monthly basis from 1893 -1912, the records included the Rushden MOH's report on the number and type of infectious diseases prevalent in the town. The MOH, or the Sanitary Inspector, frequently identified names, addresses and possible causes and contacts. Whilst these are not specific to infants, it does add to the emerging overall pattern of the state of health (or not) of the town.

In relation to the health of the community, the Rushden Minute Books were a very interesting and informative source for other kinds of information. They were available from 1891 to the end of the period being studied. Beautifully written they present a valuable record of life in Rushden, but as with much primary source material, they offer much irrelevant material, which is just as interesting as that which is relevant to the research field. This is particularly true of these books, which detail minutely fascinating events of the time, which were possibly only of contemporary relevance. They are heavily

imbued with character and their main fault lies in their addictive qualities. The selective choice of material minuted is also not apparent from the Books, but omissions become apparent when they are read in conjunction with the newspaper reports of the Council meetings.

There are three local newspapers, which were printed during the period under study: The *Wellingborough and Kettering News*, *The Rushden Echo* and the *Rushden Argus*. The Wellingborough paper was introduced in 1877 as a weekly paper and all issues exist, apart from those for 1899. It covered local, national and international news in some detail and also contained other features, such as serialised stories etc. The paper provided detailed reports of meetings of the Wellingborough Local Board, Higham Ferrers Corporation, School Boards and Boards of Health and Sanitation together with news of local events within all the areas covered in this study. The *Rushden Argus* dates from 1902 and covered much the same material, but in addition has the full MOH reports. The *Rushden Echo* dates from 1900 and is much more 'lightweight' and local to the town than the others. When used in conjunction with the Rushden Minute Books which detail the dates of council meetings, it was possible to search the papers more selectively for information, especially for the MOH reports. In general however, the newspapers, like the Minute Books, need to be viewed with caution, for as with much of the primary evidence, the accounts were written for the audience of the time, not for researchers a hundred years later. As Golby (1994) indicates, the fact that an event was not recorded does not necessarily mean that it did not happen.

The last major sources of evidence searched have been those that give more general information on the area, especially maps, directories and biographies. Maps for most of the towns and villages under review, are held at the Bedfordshire and Northamptonshire Record Offices and include both the 6 inch O.S and the 25 inch series for 1885 and 1901. The rapid growth of Rushden is very apparent in the maps, as the number of streets increases markedly with each edition. There are also Water Board plans of the same period and an underground water supply map of 1900 (Woodward & Thompson 1909).

For the purposes of this study, perhaps the most interesting aspect of the maps is the inclusion of the wells, pumps and brooks, but even this apparently objective source material may not be what it seems. From the maps, Duck Street can be seen on the edge of Rushden during the 1890s. The gardens were quite large and trees were drawn in many of them. A brook ran along the back of the gardens, in what looks like an idyllic setting, but Duck Street from all accounts was exceedingly unhealthy, and was often the source of complaint from the MOH, as illustrated by Hall and Harding (1985). They cite the following comment from the Rushden MOH's 1893 annual report: "*in April 1892 there were several cases of typhoid fever which the medical officer attributed to a spring in Duck Street, used by the occupants of Mr.Sargent's factory and the adjoining houses. This was no doubt caused by the overflow of cesspits into the brook*" (cited in Hall and Harding 1985:261). The MOH further reported to the Rushden Council in May 1893 - "*I look upon this* [the Duck Street brook] *as an existing evil that is dangerous in the community*" (cited in Hall and Harding 1985:262).

As well as maps, the various trade directories for the region provided another essential form of contemporary evidence. These give a potted history of the town or village, population size, schools and the number of pupils, main crops, soil type, key transport routes and main occupations. The Medical Officer of Health was also often named, together with the other General Practitioners. The main directories for this region are Whelan's of Northamptonshire (Kettering Library 1874) and Kelly's Directory of

Northamptonshire, Bedfordshire and Huntingdonshire (NRO 1898). Whilst the information related to key personnel in the town is flawed by the fact that these people had to pay for the entry, the other data tends to be consistent and provides a useful background to the study area.

Many other primary sources of information are available, but those discussed have been the most important in providing the background details for this study, particularly in Rushden, following industrialisation of the shoe industry. Whilst it is necessary to accept these sources to some extent at face value, there is however the need to be flexible and to review each in the light of new material.

Conclusion

The sources available for the study of the infant experience in Higham Ferrers, especially the combined vaccination registers provide the opportunity to explore infant mortality at the micro level. Information used to explore the context of infant mortality in the sub-district from 1879 – 1910, consisted of the details for 6693 infants. The data held on 4547 infants born from 1880 – 1889 is comprehensive as both the vaccination birth registers and infant death registers are available (Table 3:8).

When this data is supplemented with information from the CEBs, it is particularly rich and provides a cohort of infants whose individual experience of mortality can be analysed in detail. This data allowed for comparison to be made of the infant mortality experience in Rushden - a burgeoning shoe making town - with that experienced by those born in the more rural parishes and the less well developed towns. The qualitative sources are also available to support this exploration of the 'urban effect'.

The sources discussed will be used in the next two chapters to provide an overview of infant mortality in the Higham Ferrers sub-district and in the later chapters to explore the impact of industrialisation and urbanisation on the infant experience at local level.

Table 3:8 *Summary of the data and primary sources available for the study of infant mortality in Higham Ferrers 1879 – 1910*

Years	VBRs	IDRs	Reg - Gen Data	Comments
1879	√	√	√	
1880	√	√	√	
1881	√	√	√	1881 census available
1882	√	√	√	
1883	√	√	√	First MOH report available for the HF s-d
1884	√	√	√	
1885	√	√	√	
1886	√	√	√	
1887	√	√	√	
1888	√	√	√	
1889	√	√	√	
1890	√	√	√	RUDC Minute Books available
1891	√	√	√	1891 census available
1892	√	√	√	
1893	√	√	√	
1894	√	X	√	Infant death registers missing after 1893
1895	√	X	√	Re-organisation of sub-district adding parishes
1896	X	X	√	Vaccination Birth registers missing
1897	X	X	√	Vaccination Birth registers missing
1898	√	X	√	
1899	√	X	√	
1900	√	X	√	
1901	√	X	√	1901 census available
1902	√	X	√	
1903	√	X	√	
1904	√	X	√+	Re-organisation of sub-district adding parishes
1905	√	X	√+	
1906	√	X	√+	
1907	√	X	√+	
1908	√	X	√+	
1909	√	X	√+	
1910	X	X	√+	

Source: VBRs and IDRs / CEBs 1881,1891,1901

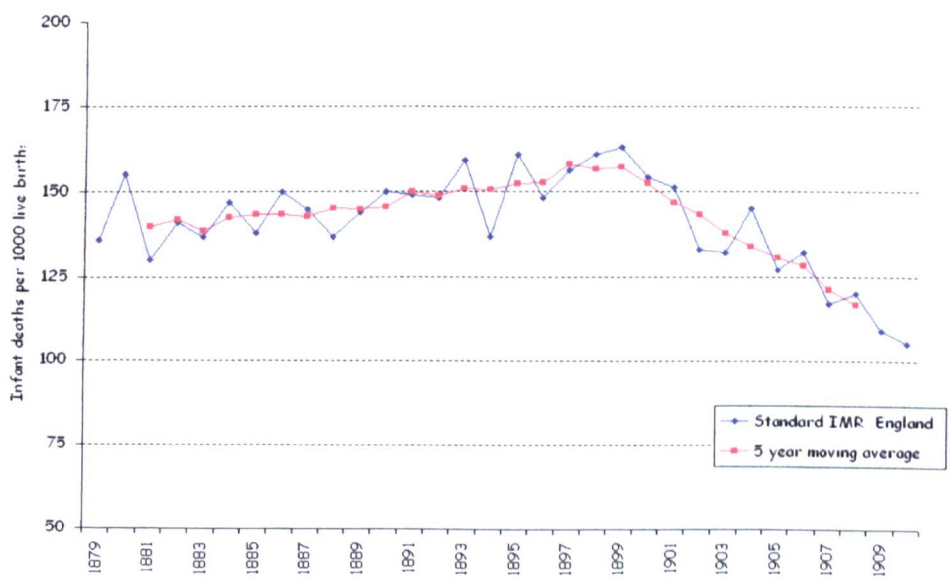
Chapter 4. Infant Mortality in Higham Ferrers, 1879 - 1910

According to Thomas (1883) the infant mortality rate in the Higham Ferrers sub-district in the early 1880s, was high for what he considered to be a rural area. In this chapter, the pattern of infant mortality for the sub-district during the period from 1879 – 1910, will be explored, using relevant published data, in particular the Registrar Generals' quarterly reports. Standard infant mortality rates in the sub-district will be compared with those at national, county and district levels in order to set the Higham Ferrers infant experience in context. In addition, other factors identifiable from published data sources and thought to be influential in the infant experience, such as population growth and density and season of birth and death will be explored.

4.1 Infant mortality patterns from published sources: 1879 – 1910

Infant mortality patterns in England and Wales for the period from the 16th to 19th century, changed over time with the highest overall rates of approximately 195 infant deaths per 1000 live births occurring during the early 18th century (Wrigley et al 1997). During the period studied in this thesis from 1879 – 1910, the pattern of infant mortality in England and Wales derived from the Registrar Generals' quarterly reports was one of a steady rise from 1879, peaking in 1899 (Figure 4:1). This short term rise in infant mortality at the end of the 19th century was thought to result from epidemic diarrhoea, occurring in urban settlements brought about by environmental conditions in conjunction with a series of long hot dry summers (Newman 1906; Woods et al 1988; Williams and Galley 1995). The infant mortality rate in England and Wales then declined rapidly from the beginning of the 20th century, but explanations for the decline vary considerably and have been the subject of much debate (Lee 1991).

Figure 4:1 *Infant Mortality rates in England and Wales 1879 – 1910*



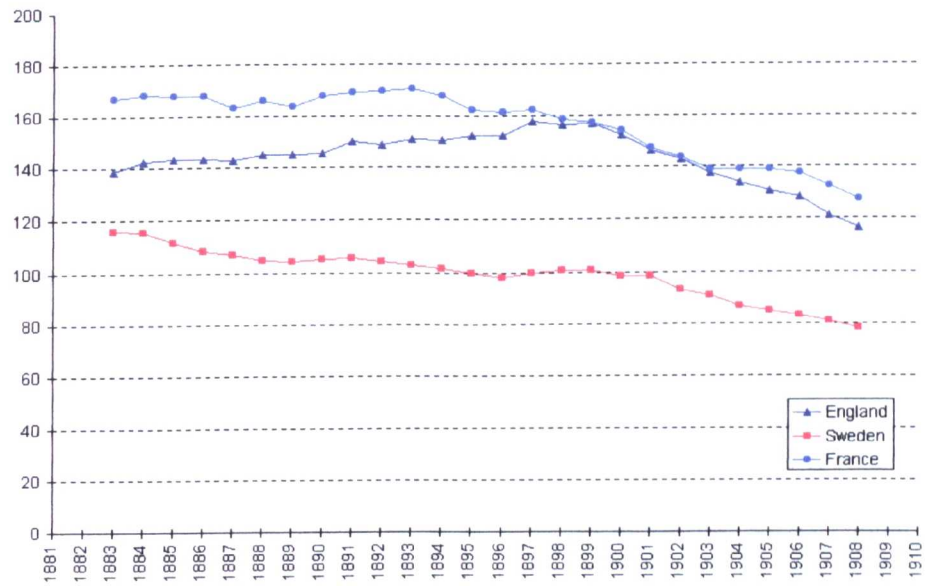
Source: Registrar Generals' quarterly reports (1879 -1910)

Lee also indicated that the pattern throughout advanced industrial nations was one in which *"the fluctuating levels, which obtained through the second half of the 19th century, gave way to widespread and rapid decline through the 20th century"* Lee (1991:56). The fluctuating rates are thought to have resulted from epidemic infections (Szreter 1988).

The decline in the infant mortality rate accelerated from the end of the 19th century in most countries in Western Europe, regardless of when it first began and despite substantial differences in the extent of infant mortality (Woods et al 1988; Lee 1991). Woods et al (1988) identified three distinct national patterns of decline:

a) In England and Wales, infant mortality was seen to rise from the early 1880s, peaking in 1899 at 163 infant deaths per 1000 live births, followed by a steep decline. By 1910 the rate was 105 per 1000 (Figure 4:1).
b) A second pattern was seen in France, where the rate declined from 1890, with a slight reversal at the end of the 19th century followed by a steep decline from a standard IMR of 169:1000 in 1898 to 111:1000 in 1910 (Figure 4:2)[1]. According to Woods this pattern was also typical of that seen in Italy and Belgium.
c) A different pattern pertained in Scandinavia. In Sweden, which had a much lower rate initially, there was an almost continuous decline from 1881 (Figure 4:2). Again there was a slight rise in the standard IMR at the end of the 19th century but the overall trend was down from 113:1000 in 1881 to 75:1000 in 1910.[2]

Figure 4:2 *Comparison of 5 year moving averages in standard Infant Mortality Rate for England, France and Sweden 1881 - 1910*



Source: Adapted from Woods (1988:349)

According to Gardarsdottir (2002) a similar pattern in the rate of infant mortality occurred in Norway, although the rate was much higher initially. She indicates, however, that there was not a rise in standard IMR at the end of the 19th century; instead the rate declined continuously from 1890. The pattern of infant mortality in Iceland was seen to be similar to that of Norway (Gardarsdottir 2002).

It would appear therefore, that whatever the national pattern of infant mortality, by the beginning of the 20th century infant mortality rates had started to decline or were already declining and continued to do so. Nonetheless, interesting though the national patterns are, according to Woods et al (1988), it was the rate of infant death in the great industrial cities of the north of England and in London that dictated the national pattern of infant mortality.

[1] The rise in IMR described by Woods (1988:348) for France at the end of the 19th century, is barely discernible in the 5 year moving averages, but the rate rose from 155:1000 in 1889 to 180:1000 in 1895 before declining again. This was however only one of many fluctuations in rate that occurred during the 1890s in France.

[2] According to Woods et al (1988) the highest rate (112:1000) occurred in 1900 in Swedish IMR, but as with the French rate, the 5 year moving average masked many fluctuations in rate during the 1890s.

The overall pattern in England and Wales was therefore not necessarily representative of that in all registration districts. Lee (1991) in support of this view also argued that the national patterns were formed from an aggregate of local patterns and therefore theories that concentrate solely on national patterns are likely to misrepresent what is happening in smaller towns and parishes throughout the country. Lee explored the county rates of infant mortality using data from the Registrar Generals' returns and found a wide variation not only in rates of infant death, but also in the pattern over time. In general he found that the more rural counties were healthier, although this was not always the case. Some such as Cornwall and Norfolk experienced high rates of infant death, indicating that urbanisation was not the sole factor in determining infant death rates.

In Northamptonshire, evidence from the Registrar Generals' quarterly reports, indicates that the IMR was lower overall than the national rate, but remained fairly static throughout the period from 1880 to the mid 1890s, with an average IMR of 134:1000 (Figure 4:3)[3]. At the end of the 19th century, there was no clearly identifiable, short term rise in IMR visible in the 5 year moving average, but the rates for the years 1897 and 1898 were both higher than previous or succeeding years at 144:1000 and 140:1000 respectively. The rate then declined steeply to 88 per 1000 by 1910. The continuity of the decline was disrupted by a slight rise in IMR from 1903 - 1905 when there were outbreaks of measles and whooping cough and then a large outbreak of diarrhoea in 1905 (Registrar Generals' quarterly reports (Figure 4:3)

Figure 4:3 *Standard IMR for Northamptonshire 1880 – 1910*

Source: Registrar Generals' quarterly reports (1879 -1910)

Lee (1991) in his survey of county patterns of infant mortality indicated that instead of falling uniformly from the end of the nineteenth century, county level infant mortality rates started to decline any time between 1860 and 1900. Contrary to the evidence seen in Figure 4: 3 of an apparently static pattern of infant mortality, Lee found that in Northamptonshire the rate peaked in 1871 and was then followed by a continuous decline. He had however, calculated infant mortality using the average of three years centred on the census years from 1861 and this may account for the difference that he described in the trend from 1880 onwards. The infant mortality pattern in Northamptonshire was characterised by annual fluctuations in IMR and therefore if other years are used, the resulting figures may differ.

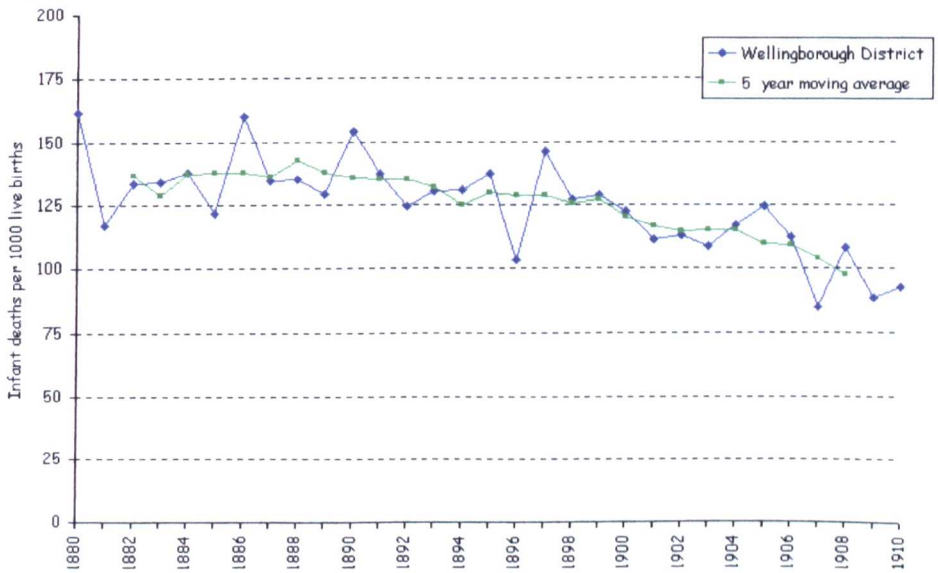
[3] The data for 1879 from the Registrar Generals' quarterly reports for the county, the district and the sub-districts of Wellingborough and Earl's Barton were not available for this study.

By illustrating his point the way he does, the rate appeared to decline during the last two decades of the 19th century. [4] In fact, if Lee had chosen to illustrate his theory by centring his figures one year later, then the figures for Northamptonshire would have been 1882 - 123; 1892 - 137; and 1902 – 113, indicating that the infant mortality rates rose again during the 1880s and 1890s before declining in the 19th century. This example demonstrates the need for caution when using individual years to demonstrate changes over time, especially where there are annual fluctuations in rate (Williams & Galley 1995).

As with the national pattern, that of the county is also an aggregate of data from the registration districts. Within Northamptonshire, the main industrial centres were Northampton and the towns of the Wellingborough Registration District where shoes were made. In 1881 these areas accounted for 32% of the county population and 34% in 1891. The rest of the county was largely rural and sparsely populated, but it was there that two thirds of the population lived. It is likely therefore that what happened in the rural areas with regard to infant mortality would have heavily influenced the county pattern which was low when compared to that of the more industrialised areas (Williams & Galley 1995).

The pattern of infant mortality for the Wellingborough District was similar to that of Northamptonshire, but the smaller numbers of births and deaths in the district made the fluctuations in IMR appear greater.[5] The evidence from the 5 year moving average, suggests that the rate for the district declined steadily from 1888 – a pattern not dissimilar to that identified by Lee (1991) for Northamptonshire and to that described by Woods et al (1988) for France, Belgium and Italy, although the rate overall was much lower (Figure 4:4).

Figure 4:4. *Standard IMR and the 5 year moving average for Wellingborough District from 1880 – 1910*



Source: Registrar Generals' quarterly reports (1879 -1910)

In Higham Ferrers, the pattern of infant mortality was one of steep decline from the mid 1870s until the mid 1880s, followed by a slight rise until the end of the 1890s, when the rate was 147 infant deaths per 1000 live births in 1897 and 155 per 1000 in 1898. Although the rate was low in 1899, it rose again to 137 per 1000 in 1900 and then declined, such that

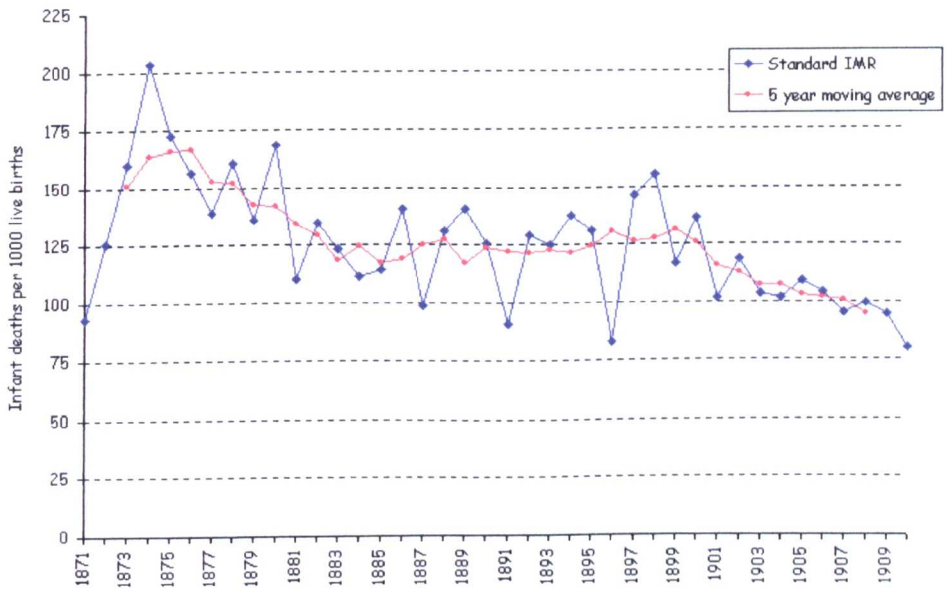
[4] Lee chose one point in each decade: 1861,1871,1881,1891 and 1901 to represent the pattern. The figure for each point represented the mean of the 3 years centred on it. Lee gave the figures for Northamptonshire as 1881 – 138; 1891 – 136; 1901 – 116.

[5] The Wellingborough District births and infant deaths during the period studied, accounted for 13 – 16% of Northamptonshire births (Figure 4:7).

by 1910, the IMR was only 80 per 1000 (Figure 4:5). This short term increase in IMR in the late 1890s resembles the pattern for England and Wales, more so than it does the county or district patterns. As in the Wellingborough District pattern, the fluctuations in rate were very marked. In the last quarter of the 19th century there were three years - 1887, 1891 and 1896 - when IMR fell below 100 deaths per 1000 live births.[6]

The extent of fluctuation was significantly smaller as the IMR declined from 1900, but, as in the district pattern, a slight rise in IMR during 1905 can be discerned. The highest rates in IMR in Higham Ferrers occurred in the 1870s immediately before the period studied. This was at a time when industrialisation of the shoe industry began to impact on the sub-district, supporting King's (1997) view that the greatest increase in infant mortality occurred in a period of proto-industrialisation.

Figure 4:5 *Standard IMR in Higham Ferrers: 1871-1910* [i]



[i] The data for 1871-1878 has been included to demonstrate the rapid decline in IMR for the years in the second half of the 1870s and early 1880s. It is not known whether the low rate in 1871 was part of a trend in IMR or whether this was a particularly low year

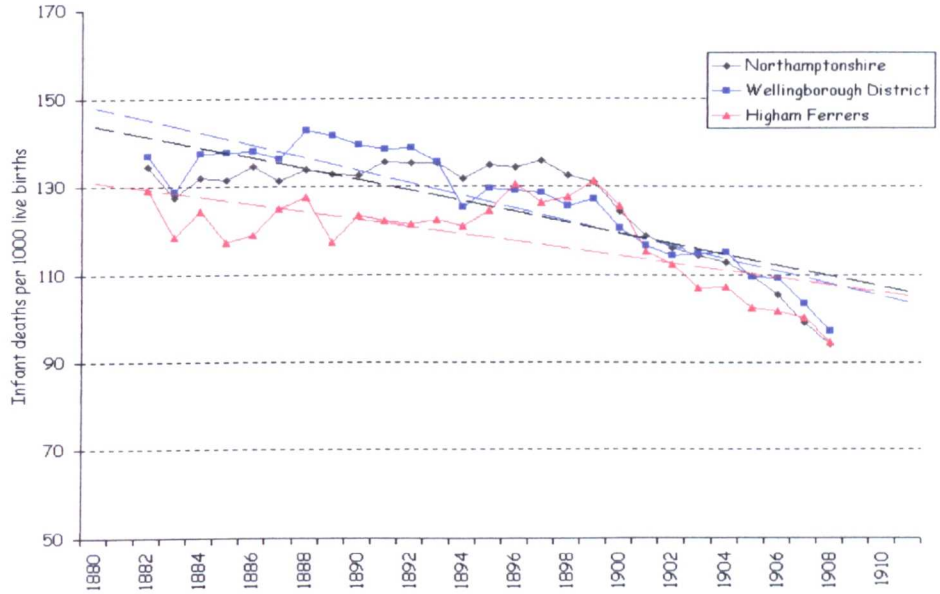
Source: Registrar Generals' quarterly reports (1879 -1910)

Comparison of the patterns of IMR at county, district and sub-district level reveal that obvious differences in the character of IMR patterns and rates exist. The pattern for Higham Ferrers was distinct from that seen at the other levels in that, although lower than the other rates initially, the IMR started to rise from 1894 and was seen to be slightly higher than the district IMR in 1900 at 131:1000 but equal to that seen at county level (Figure 4:6).

Whilst the trend for all three levels showed a decline, that for Higham Ferrers was less steep than that seen for the same period in Northamptonshire and Wellingborough district data. As the rate was lower initially, this was a reflection of the relatively much greater increase in rates at the end of the 19th century experienced by the sub-district.

[6] The cause of these fluctuations in rate during the 1880s will be discussed further in Chapter 8.

Figure 4:6. *Comparison of the pattern of IMR from 1880 – 1910 in Northamptonshire, with that of Wellingborough district and the Higham Ferrers sub-district; using 5 year moving averages*



Source: Registrar Generals' quarterly reports (1879 -1910)

Figure 4:7 *Contribution of births and death to the Northamptonshire data and of the sub-districts to the Wellingborough District data 1880 – 1904*[i]

Northamptonshire
Births: 234362
Deaths: 30616
IMR: 131:1000

Wellingborough District
Births: 37204 (16%)[ii] (37108)
Deaths: 4814 (16%) (4824)
IMR: 129:1000

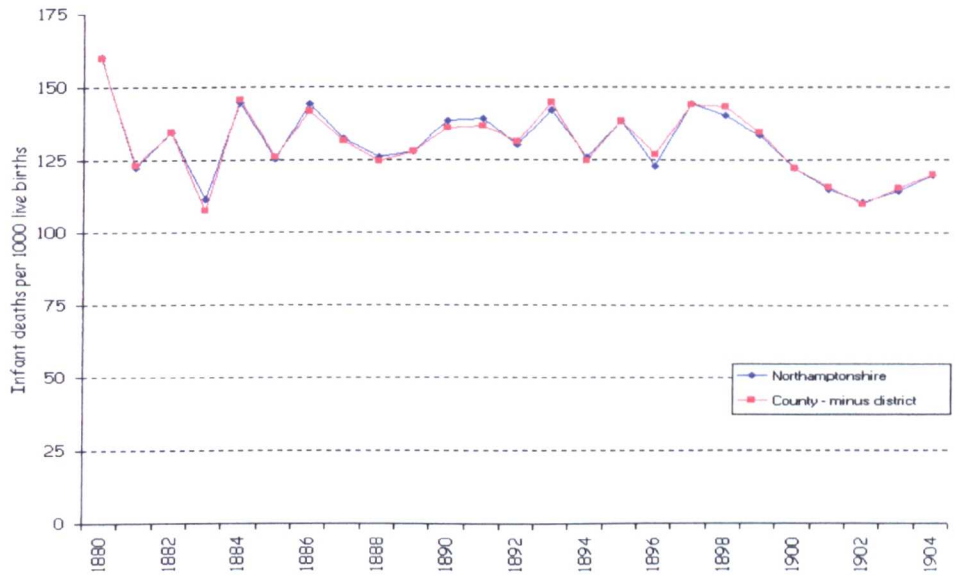
Earls Barton sub-district	**Higham Ferrers sub-district**	**Wellingborough sub-district**
Births: 5728 (15%)	Births: 14747 (40%)	Births: 16633 (45%)
Deaths: 694 (15%)	Deaths: 1802 (37%)	Deaths: 2318 (48%)
IMR: 121: 1000	IMR: 122: 1000	IMR: 139: 1000

[i] The years 1905 – 1910 have been omitted because the Earls Barton sub-district ceased to exist and the parishes were included with those of the Higham Ferrers and Wellingborough sub-districts after 1904.
[ii] Percentage contribution of births to the Northamptonshire data. There is a slight discrepancy in the numbers of births and deaths in the Wellingborough published data possibly due to dates of registration.
Source: Registrar Generals' quarterly reports (1879 -1910)

At each level; county, district and sub-district, births and deaths contribute to higher levels and therefore, extreme variations at one level can affect the pattern of the levels above. On average, between 1880 and 1904, births and deaths in the district contributed 16% to the total births and infant deaths in the county. Those born in Higham Ferrers contributed 40% of the births and 37% of the deaths to the total for the district

(Figure 4.7). The impact this has on annual IMR is revealed when the numbers of births and deaths at one level are subtracted from the total for a higher level (Figures 4:8 and 4:9).

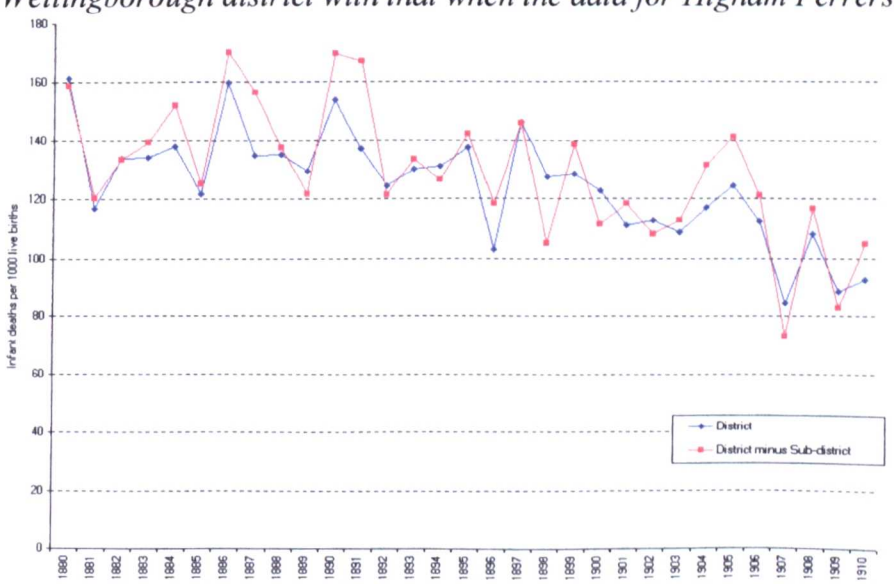
Figure 4:8 *Comparison of standard IMR for the period 1880 – 1904 for Northamptonshire with that when the data for the Wellingborough district has been subtracted* [i]



[i] The years 1905 – 1910 have been omitted because the Earls Barton sub-district ceased to exist and the parishes were included with those of the Higham Ferrers and Wellingborough sub-districts after 1904, thereby distorting the results

Source: Registrar Generals' quarterly reports (1879 -1910)

Figure 4:*9 Comparison of standard IMR for the period 1880 – 1910 for the Wellingborough district with that when the data for Higham Ferrers has been subtracted*



Source: Registrar Generals' quarterly reports (1879 -1910)

Despite the high levels of infant mortality in the Wellingborough district, the impact on the county pattern of infant mortality was in fact minimal, with, at most, a difference of 3-4 infant deaths per 1000 live births. This may have been because either the proportion of infants involved was relatively small (16%), and /or the pattern of infant death was similar (Figure 4:8).

In contrast, the difference in the rates of infant mortality for the Wellingborough district, when the Higham Ferrers births and infant deaths were subtracted, was more marked, although again the overall pattern was similar (Figure 4:9). The major change was in the extent of the fluctuations in IMR, particularly in the years when the rates of infant mortality were very low within the sub-district. For example, the rate in 1891 was 167 infant deaths per 1000 live births when the Higham Ferrers data was removed, compared to 124:1000 with the additional data. This corresponded to a particularly low IMR in Higham Ferrers of 91:1000 and clearly indicates the influence that one level can have on the next. In 1891 the sub-district contributed 39% of the births but only 26% of the deaths to the Wellingborough District IMR.

Similar situations occurred in 1886, 1890, 1899 and 1904 when the rate in the district, after subtracting the Higham Ferrers data was lower. Only in 1898 did subtracting the sub-district data lower the district data - from 128:1000 to 105:1000 - indicating that infants dying in Higham Ferrers contributed significantly to the district pattern of infant mortality in that year. The IMR in the sub-district for 1898 was particularly high at 155: 1000 and together with the high rate in 1897 of 147:1000 accounted for the 'peak' seen in the sub-district at the end of the 19th century. In Wellingborough District, higher rates were seen in 1895 (146:1000) and in 1899 (139:1000). From the comparison of the Higham Ferrers IMR with that of the district after the births and deaths are separated out, it can be seen that the pattern of infant mortality varies greatly, especially in relation to the fluctuations in the rate (Figure 4:10). The rate in the district was higher on average, but the trend was more steeply down than that of the sub-district.

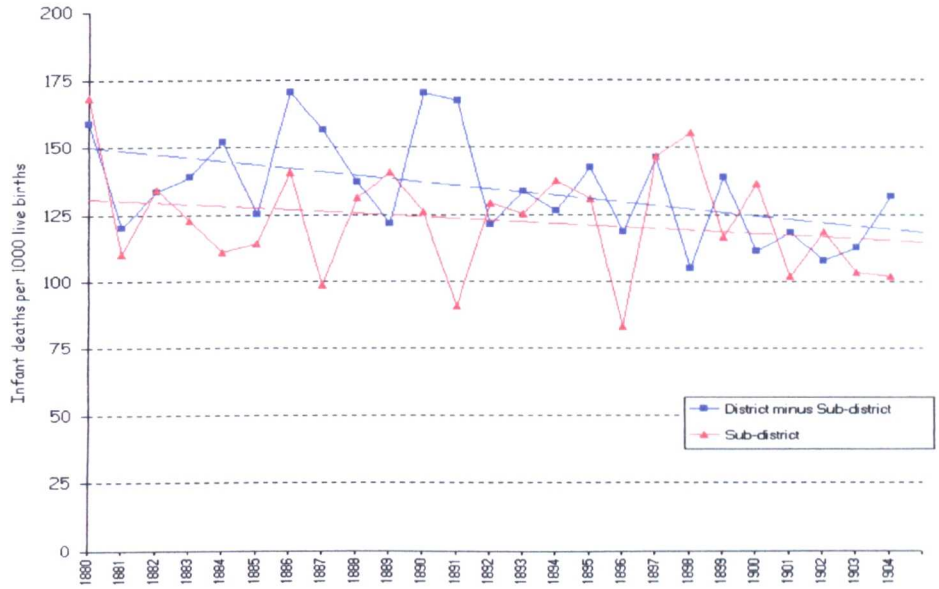
The high rates seen in the district in 1886 (170:1000), 1890 (170:1000) and in 1891 (167:1000) were indicative of infectious disease epidemics, but there is no mention of these in the Registrar Generals' quarterly reports.

In addition to Higham Ferrers, there were two other sub-districts that made up the Wellingborough district - Earl's Barton and Wellingborough. Each contributed to the IMR or the district as a whole and comparison of infant mortality rates in the three sub-districts demonstrates how varied the pattern can be in adjacent and potentially similar areas in that all three were shoemaking centres (Figure 4:11).

The Wellingborough sub-district experienced very high rates of infant death in some years, 1886 – 156:1000, 1887 – 160:1000 and in 1889 - 161:1000, which contributed to the pattern seen in the Wellingborough district as a whole (Figure 4:11). [7]

[7] The rates in Higham Ferrers sub-district were very high during the 1870s (in excess of 200:1000) but the data for the Wellingborough sub-district for this period was not included in this study. This may however be a topic for future research.

Figure 4:10 *Comparison of standard IMR in the Wellingborough district less the births and infants deaths occurring in Higham Ferrers from 1880 – 1904 with that for Higham Ferrers*



Source: Registrar Generals' quarterly reports (1879 -1910)

Figure 4:11 *Comparison of the pattern of infant mortality in each of the sub-districts forming the Wellingborough District 1880 -1910 using 5 year moving average*[8]

Source: Registrar Generals' quarterly reports (1879 -1910)

[8] Earls Barton disappeared as a sub-district in 1904 – the last births and deaths were recorded in the months April to June. After that the data was added to the other two sub-districts. See Chapter 2 for a fuller discussion of this issue.

From 1892, however, the differences in rate between Wellingborough and the other two sub-districts were less marked. By 1899, the rate in Earl's Barton was higher than that in Wellingborough and in the following year, the rate in Higham Ferrers also exceeded the Wellingborough rate. The decline in IMR in the 20th century in Higham Ferrers was however faster and more regular than in the Wellingborough sub-district.

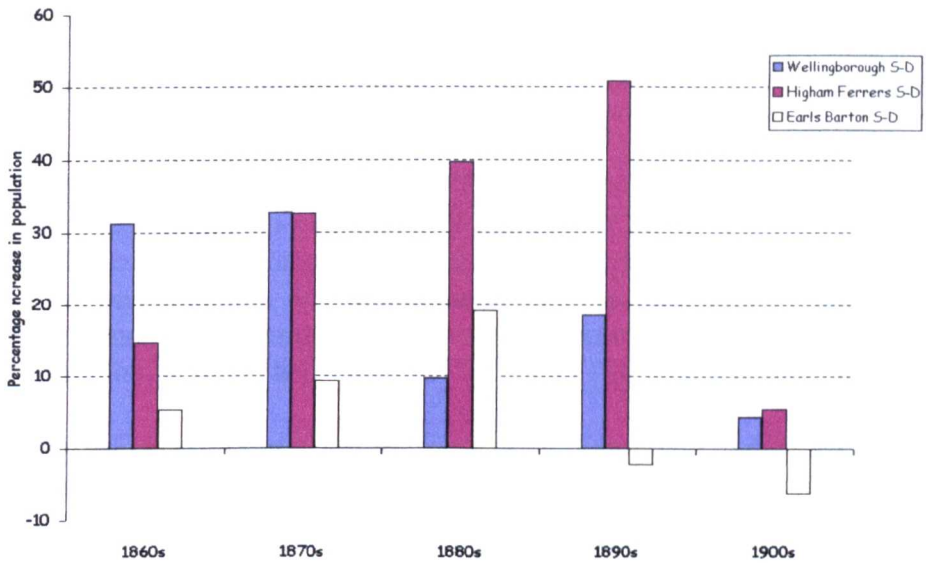
In conclusion, the pattern of infant mortality in the sub-district was seen to be one of pronounced peaks and troughs, including a short term peak at the end of the 19th century, which was absent from the County and District data. The secular decline in infant mortality, which was seen to occur in most of Western Europe, was clearly evident in the Higham Ferrers pattern (Woods et al 1988). Also in common with most other places, regardless of the level of IMR, the peaks and troughs in rate largely disappeared as the rate declined steeply from 1900. It is possible to speculate that the variability in IMR was caused by epidemics and therefore that the removal of the variability in rate resulted from a reduction of mortality from infectious disease, but as there is no cause of death data available for the sub-district, this cannot be confirmed (Szreter1988). Many factors, such as urban living have been implicated as being influential in infant mortality, but as the data from the Registrar Generals' reports only provide information at sub-district rather than parish level, analysis of the impact of urbanisation in Higham Ferrers was not possible using this source. Information was available however on the population growth from the CEB reports and of the seasonality of infant death from the Registrar Generals' quarterly reports.

4.2 Population

According to Woods et al (1988) the pattern of infant mortality in England and Wales, was greatly influenced by what was happening in the major industrial centres since these were inhabited by a large proportion of the population. In these densely populated areas infant mortality rates rose faster during the period from 1880 to 1900, than in less populated areas, and then declined more sharply in the 1900s. Over half of the infant deaths in the country, occurred in 43 of the 590 registration districts in England and Wales during the three decades of the 1880s, 1890s and 1900s (Woods et al 1988). According to Woods, it may well have been the 'urban effect' or concentration of deaths in urban areas in late 19th century England, that was responsible for delaying the onset of the secular decline in infant mortality, seen to occur in other countries in Europe during the last quarter of the century. The towns in the Wellingborough District were very small compared to the great industrial towns and cities of the North and the Midlands of England, but all three sub-districts were predominantly shoemaking areas and, with industrialisation of the process, experienced rapid population growth and urbanisation over the period from 1850 to 1900. The timing of the population growth varied significantly between the sub-districts, with the increase in the 1850s in Wellingborough occurring before that in Higham Ferrers and Earl's Barton. In Wellingborough the rate of increase fell during the 1880s and then after a short term revival in the shoe industry during the 1890s, fell again (Figure 4:12).

In contrast, the increase in population in Higham Ferrers began initially in the 1870s, but unlike Wellingborough, the population continued to grow rapidly during the 1880s and 1890s, with a percentage increase of over 50% during the latter decade. Like Wellingborough, though, the rate of growth declined rapidly in the first decade of the 20th century. Wellingborough sub-district was the largest of the three sub-districts and between the years 1881 and 1911 accounted for approximately 45 to 50% of the population of the district, with over a third living in Wellingborough town (Table 4:1).

Figure 4:12 *Decadal percentage increase in population for each of the sub-districts forming the Wellingborough District from 1861 – 1911*



Source: Census reports 1871 – 1911

Table 4:1 *Population statistics for the Wellingborough district 1881 – 1911*

	Acres	1881	1891	1901	1911
Wellingborough District population	55761	36942	44467	55814	57611
Persons per acre in Wellingborough District		0.66	0.80	1.00	1.03
Wellingborough sub – district	18379	18969	20827	24709	25791
Persons per acre in Wellingborough sub-district		1.03	1.13	1.34	1.40
Wellingborough town		13794	15068	18412	19753
% s-d population living in Wellingborough town		72.72	72.35	74.52	76.59
% District population living in Wellingborough s-d		51.35	46.84	44.27	44.77
% District population living in Wellingborough		37.34	33.89	32.99	34.29
Persons per acre in Wellingborough town	4490	3.07	3.36	4.10	4.40
Higham Ferrers sub-district	18936	10788	15072	22731	23972
Persons per acre in Higham Ferrers sub-district		0.57	0.80	1.20	1.27
Rushden		3657	7445	12453	13354
% s-d population living in Rushden		33.90	49.40	54.78	55.71
% District population living in Higham Ferrers s-d		29.20	33.89	40.73	41.61
% District population living in Rushden		9.90	16.74	22.31	23.18
Persons per acre in Rushden	2770	1.32	2.69	4.50	4.82
Earls Barton sub-district	18446	7185	8568	8374	7848
Persons per acre in Earl's Barton sub-district		0.39	0.46	0.45	0.43
Earls Barton		2337	2602	2914	2556
% s-d population living in Earl's Barton		67.47	69.63	65.20	67.43
% District pop living in Earl's Barton s-d		19.45	19.27	15.00	13.62
% District population living in Earl's Barton		6.33	5.85	5.22	4.44
Persons per acre in Earl's Barton	1760	1.33	1.48	1.66	1.45

Source: CEB reports 1881 – 1911

Between 1881 and 1911, the percentage declined from 51% to 45% as that for Higham Ferrers rose by 12% to 42% (Table 4:1). Earls Barton, the smallest of the sub-districts, despite an increase in population of 19% in the 1880s, experienced a percentage decrease during the 1880s and the early years of the 20th century, such that it became non-viable as a sub-district and had been incorporated into the other two sub-districts by the time of the 1911 census.[9]

The population growth in Higham Ferrers occurred largely in the shoemaking towns, where the population rose by 163% from 7,877 to 20,710. This contrasted with the total population of the rural parishes which remained relatively static between 1861 and 1911, at approximately 3000. Rushden became the major town of the sub-district during the period under study and experienced high rates of growth, including a staggering increase in population of 103% between 1881 and 1891 (Table 4:2 & Figure 4:13).

Table 4:2 Population of the parishes of Higham Ferrers 1861 to 1911

	1861	**1871**	**1881**	**1891**	**1901**	**1911**
Rushden	1748	2122	3657	7445	12453	13354
Irthlingborough	1800	2172	2736	2998	4314	4630
Higham	1152	1232	1484	1821	2540	2726
Rural parishes	2390	2606	2983	2894	3424	3262
Higham Ferrers s-d	7090	8132	10860	15158	22731	23972

Source: Census reports 1861- 1911

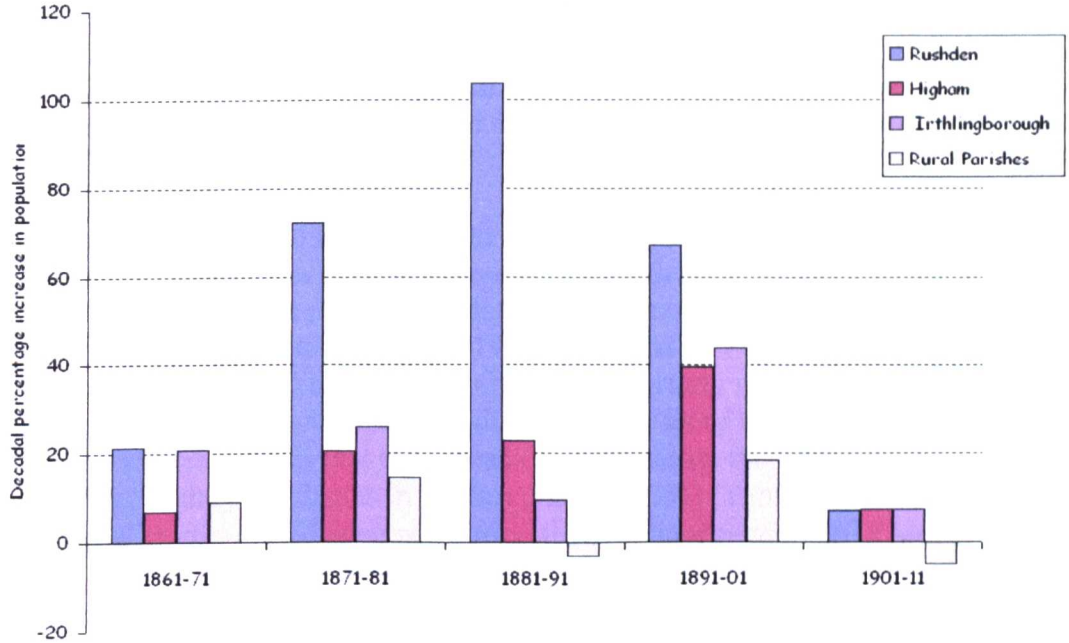
By 1901, over 55% of the people living in the sub-district were concentrated in Rushden compared to 34% in 1881. As a result of the massive rise in population, population density also increased nearly fourfold from 1.32 persons per acre in 1881 to 4.82 in 1911; a rise greater than any seen in the other major towns of the Wellingborough district (Figure 4:13 & Table 4.2).

As indicated by Thomas (1883) this must have impacted adversely on the conditions within the town, especially on the availability of adequate supplies of clean water and effective sanitation. Woods et al (1988) have also indicated that there is a relationship between population density and infant mortality and that around 50% of the variation in infant mortality rates could be attributed to variations in population density. The impact on infant mortality within the town cannot however be determined using published source data since information is not available at individual parish level.

The growth of the other towns in Higham Ferrers between 1881 and 1911 was far less dramatic, although the impact of shoemaking during the last two decades of the 19th century was clearly visible. The population in Irthlingborough was larger than that of Rushden in 1861, but it only increased by 2,830 (157%) over the next 50 years in contrast to Rushden where the population increase was 11,606 (664%) (Figure 4:12). In Higham the population increase was 137% whereas in the rural parishes the overall increase was much smaller at 37% due to the decline in population during the 1890s and 1900s.

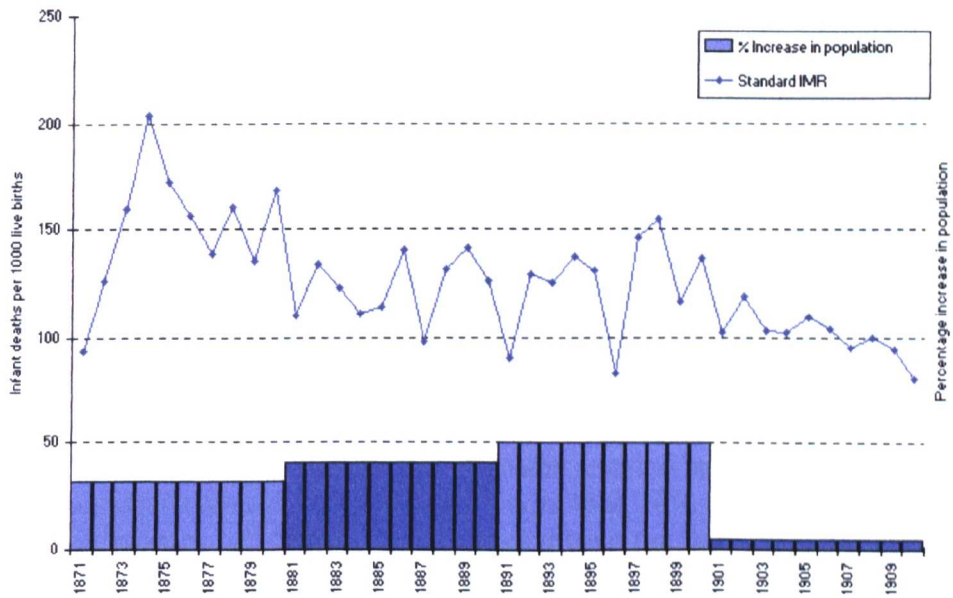
[9] Following the removal of Earl's Barton as a sub-district in 1904, the format of the census reports changed for 1911. The previous sub-district structure has however been maintained in this study for consistency and so allow for comparison with information available from the Registrar Generals' quarterly reports where possible.

Figure 4:13 *Decadal percentage increase in population in the parishes of Higham Ferrers from 1861 – 1911*



Source: Census reports 1861- 1911

Figure 4:14. *Comparison of decadal percentage increase in population with Standard IMR in Higham Ferrers 1871 – 1910*



Source: Registrar Generals' quarterly reports 1871 – 1910 and Census reports 1871-1911

In Higham Ferrers, the correlation between decadal increases in population and patterns of infant mortality appears limited. As Figure 4:14 shows, the high infant mortality seen in Higham Ferrers during the 1870s was accompanied by a percentage increase in population of 33%. Whilst this was a substantial increase, the population increased by a further 40% in the 1880s, but the decadal IMR was lower than that seen in the previous decade and remained so until the second half of the 1890s – despite a 50% increase of the population

during the latter decade. Perhaps the most striking feature of the pattern of infant mortality in the sub-district is the coincidence in the decline in population growth over the first decade of the 20th century and the decline in infant mortality (Figure 4:14). This must be taken into account when reviewing the factors influencing the decline in infant mortality in the sub-district. If the brief period in the late 1890s when infant mortality rose is ignored, then these results are in keeping with King's (1997) findings that the greatest detrimental effect on infants (and others) occurs during the early period of urbanisation or proto-urbanisation.

4.3 Seasonal patterns in infant mortality

According to Williams (1992) seasonality of death is an indicator of the health of the community, with high peaks in the late summer months indicative of epidemic diarrhoea, especially in urban settings. Huck (1997) indicated that winter deaths were likely to be respiratory in origin. The Registrar Generals' quarterly reports provided information on the seasonality of death within the sub-district. Analysis of the years from 1879 – 1910, based on percentages, reveals that the spread of births across the year was relatively even, with if anything, slightly less births in the last quarter (23%) (Table 4:3). In contrast the greater pattern of deaths (32%) occurred during the first quarter months of January to March.

Table 4:3 *Percentage births and infants deaths by season from 1879 – 1910 in Higham Ferrers*

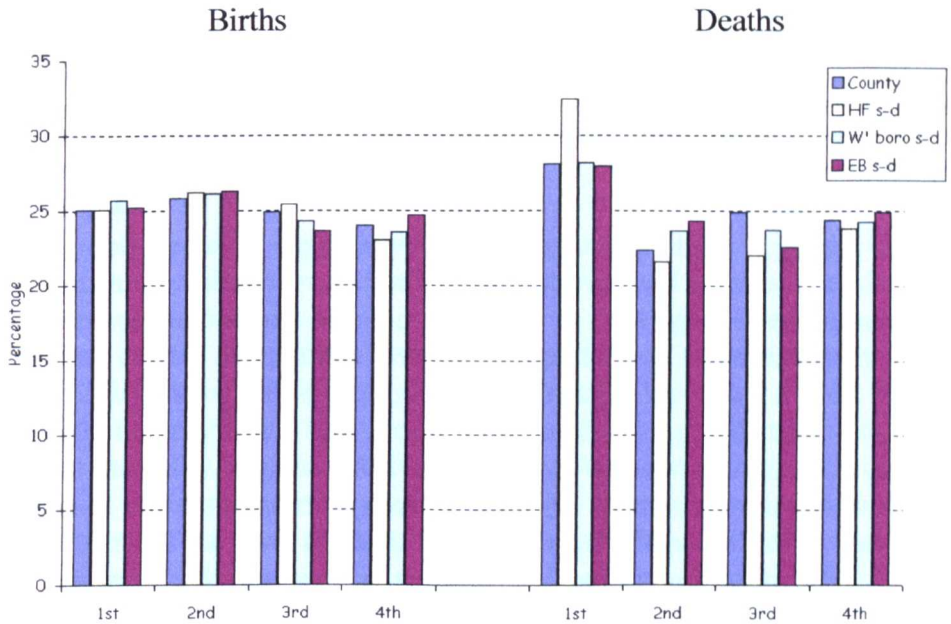
	Births	Deaths
1st quarter	25.10	32.43
2nd quarter	26.29	21.62
3rd quarter	25.47	22.10
4th quarter	23.13	23.85

Source: Census reports 1861- 1911

When the seasonality of the births and deaths were compared with those of the other sub-districts and with Northamptonshire it was seen that the patterns were similar, with on average a greater percentage of infant deaths occurring in the first quarter months (Figure 4:15). The percentage of 1st quarter deaths in Higham Ferrers was slightly higher (32% compared with 28%) than elsewhere, but as can be seen from Figure 4:15, the percentage of first quarter births was remarkably consistent across all sub-districts. This increased percentage of deaths may be a feature of the timing of notification of death in Higham Ferrers, because the data is derived from the date of registration, rather than date of death, but this cannot be explored using the published data sets.

In the first quarters of seven of the twenty-five years in the Higham Ferrers sub-district from 1879 to 1904, the percentage of deaths notified in the first quarter was above 40% of all infant deaths and in 1888 and 1890 more than 50% of the infant deaths were registered between January and March. Infants born during the first quarter had the least chance of survival, possibly because they had to endure two cold periods before reaching their first birthday, but from the data it was not possible to link births and deaths, or to determine age at death (Reid 2001).

Figure 4:15 *Comparison of the seasonality of births and deaths in Higham Ferrers with those in the County, Wellingborough and Earls Barton sub-districts 1880 – 1904*[i]

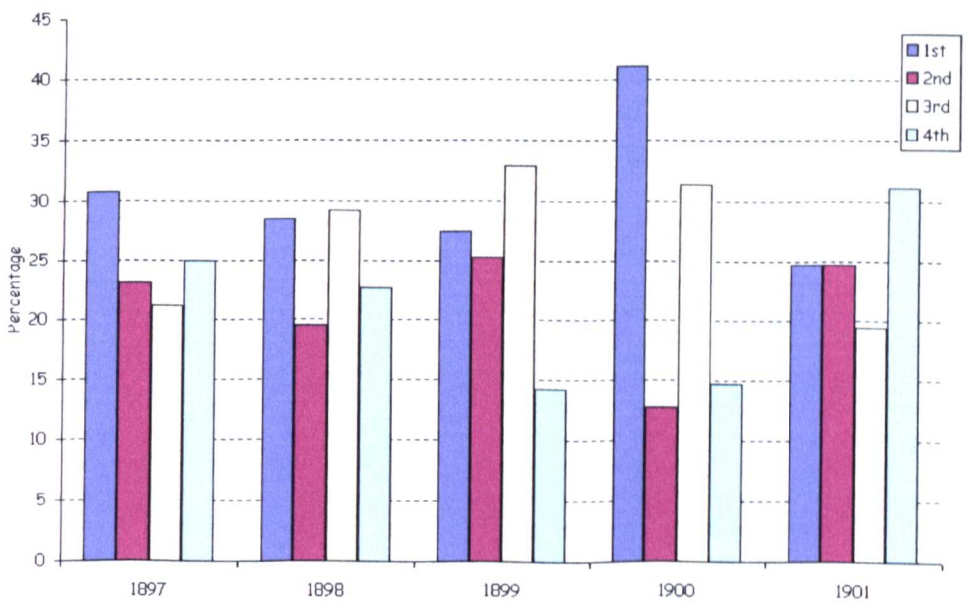


[i] The years 1905 – 1910 have been omitted because the Earls Barton sub-district ceased to exist and the parishes were included with those of the Higham Ferrers and Wellingborough sub-districts after 1904, thereby distorting the results

Source: Registrar Generals' quarterly reports (1879 -1910)

There was some indication of a rise in 3rd quarter deaths in the Higham Ferrers seasonal pattern of infant mortality during the years at the end of the 19th century, with over 30% of infant deaths being notified between July and September in 1899 and 1900 (Figure 4:16).

Figure 4:16 *Percentage deaths per quarter in Higham Ferrers during the years 1897 – 1901*



Source: Registrar Generals' quarterly reports (1879 -1910)

According to Newman (1906), the rise in IMR seen in the 3rd quarter months in urban settings was brought about by epidemic diarrhoea; whether this was the cause of the 3rd

quarter percentage increase in Higham Ferrers is unclear from the published sources available (Woods et al 1988; Williams & Galley 1995).

Despite the apparent increase in 3rd quarter deaths, the percentage of 1st quarter deaths in 1900 is also very marked. As before without cause of death information and actual dates of birth and death it is not unfortunately possible to identify what the factors were that underpinned this pattern of infant death in the sub-district.

Conclusion

The published data, especially that originating from the Registrar Generals' quarterly reports are a valuable resource for the historian and for this study has provided information to explore the patterns of infant mortality in the Higham Ferrers sub-district with that at district, county and national levels. The pattern of infant mortality in the sub-district was seen to be one of pronounced peaks and troughs including a short term peak at the end of the 19th century which was absent from the county and district data. The secular decline in infant mortality, which occurred in most of Western Europe, was clearly evident in the Higham Ferrers pattern (Woods et al 1988). Also in common with most other places regardless of the level of IMR, the pattern was characterised by peaks and troughs in rate, which largely disappeared as the rate declined steeply from 1900. The factors underlying this pattern are however far from clear; as was the reason for the higher percentage of infant deaths, which occurred in the sub-district during the first quarter months of most years.

Useful though the data from published sources are, however, they do have their shortcomings. For example, the lack of parish-level data is a major limitation for this study, which aims to explore the impact of industrialisation and urban growth on the infant experience in Rushden. Nor does the data allow for exploration of many of the factors thought to be influential in the infant experience such as age at death and social class and as Williams (1992:74) indicates "*the sources that do provide such detail (the civil birth and death registers) are not available to researchers at this time*". According to Williams, the task of trying to assess the impact of various complex factors on the infant experience requires localised individual information, which allows the complex inter-relationships to be disentangled. In the next chapters the smallpox vaccination birth and infant death registers, which do provide this information, will be used to explore some of the complexities surrounding infant mortality during the period from 1879 to 1910 in the Higham Ferrers sub-district.

Chapter 5. Cohort Infant Mortality in Higham Ferrers, 1879 - 1910

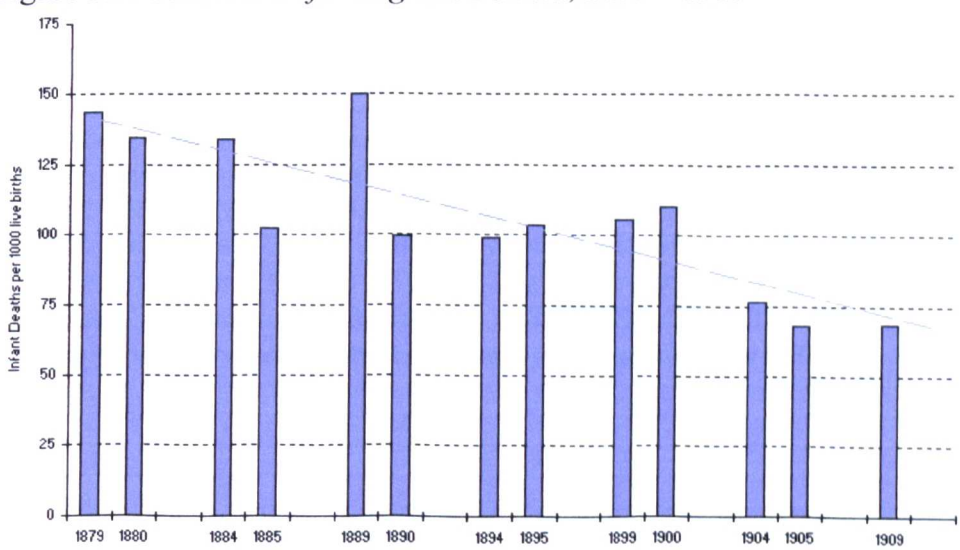
The Registrar General's quarterly reports provided information at sub-district level to chart the pattern of infant mortality in the Higham Ferrers sub-district from 1879 to 1910 and gave some indication of the seasonality of birth and death. However, whilst the patterns derived demonstrated clearly some aspects of the mortality experience of infants during the study period, the information from the published sources was seen to have its limitations for the purpose of this study (Chapter 4). For, as Williams indicates, '*any attempt to untangle the complex relationship between infant mortality, environment and social class using the published data is at the very least, problematic*' (Williams 1992:74).

In this chapter the smallpox vaccination birth registers and infant death registers will be used to explore three key issues in the discussion of infant death, i) the urban – rural effect ii) the influence of gender and iii) neonatal mortality. The smallpox vaccination registers have the advantage of providing actual dates of birth and death for infants born within individual parishes of the sub-district and therefore provide the data required to explore these issues.

5:1 Cohort Infant Mortality using the vaccination birth and infant death registers [1]

Data collected from the combined vaccination registers (CVRs) for two consecutive years at three-year intervals for the period from 1879 – 1905, was used to calculate cohort IMR (Figure 5: 1). Not all the vaccination registers were available for the years covered by this study, but this selection of registers provided sufficient data to give a clear indication of not only the pattern of infant mortality, but also information related to the issues under discussion in this chapter: neonatal mortality and parish rates of infant death. Cohort IMR was used because it linked the infants' experience of life and death, regardless of whether the calendar year of birth and year of death were the same or different and therefore allowed the individuality of the experience to be identified.

Figure 5:1. *Cohort IMR for Higham Ferrers, 1879 – 1909*[i]



[i] The vaccination birth register was incomplete for 1910

Source: CVRs

[1] The database used is a combination of these two registers and will be known throughout the chapter as the *'Combined Vaccination Registers'* (CVRs).

The pattern of IMR using this method of calculation was substantially different from that seen using standard IMR because the distribution of deaths was altered. As with standard IMR, a clear downward trend was demonstrated, but cohort IMR was lower for most years studied, with the exception of 1879, 1884, and 1889. This resulted from the source data and the way in which births and deaths were apportioned to particular groups. In addition, the Registrar Generals' data also included deaths of infants who were born outside the area but who died following migration to the sub-district. These infants have been omitted from the source data used for calculation of cohort IMR because their experience at birth was potentially different from that of infants born within the sub-district.[2] This difference in rate is not a problem as both methods are valid, but are measuring different aspects of mortality and cannot therefore be compared. By using the measures together it is possible, however, to enhance our understanding of the information gained.

A new feature found when exploring infant mortality, using the smallpox vaccination data and cohort IMR, was the apparent increase in the infant mortality rate (148:1000) in 1889. Whilst standard IMR (141:1000) was high the 'peak' effect was not so marked, because the standard IMR in 1890 was 126:1000 (Figure 4:5). This compared with 100:1000 for cohort IMR (Figure 5:1) and suggests that the 1889 cohort of infants were unhealthy, or they faced particularly hazardous conditions. Many of the 1889 cohort (29) died in 1890. They represented 38% of the cohort deaths and accounted for 59% of the deaths occurring in 1890. The cohort born in 1890 was generally healthy with a low IMR, and it may be that the influences which caused infant death, were not equally detrimental for all infants, but were especially so for those born in 1889.[3] On the other hand, 37% of the deaths of infants born in 1888 occurred in 1889, supporting the view that the environment may have been an influential factor in infant death during 1889.

The rise in standard IMR (136:1000) in 1900 is barely visible when cohort analysis (111:1000) is used. Again this may be because of the way births and deaths are distributed using the various sources of data. Standard IMR rose steeply in 1897 (148:1000) and 1898 (155:1000), but the vaccination registers for these years are missing and therefore comment on the cohorts involved is not possible (Figure 5:1). The very marked decline seen in cohort IMR in the first decade of the 20th century resembled that seen using standard IMR calculations.

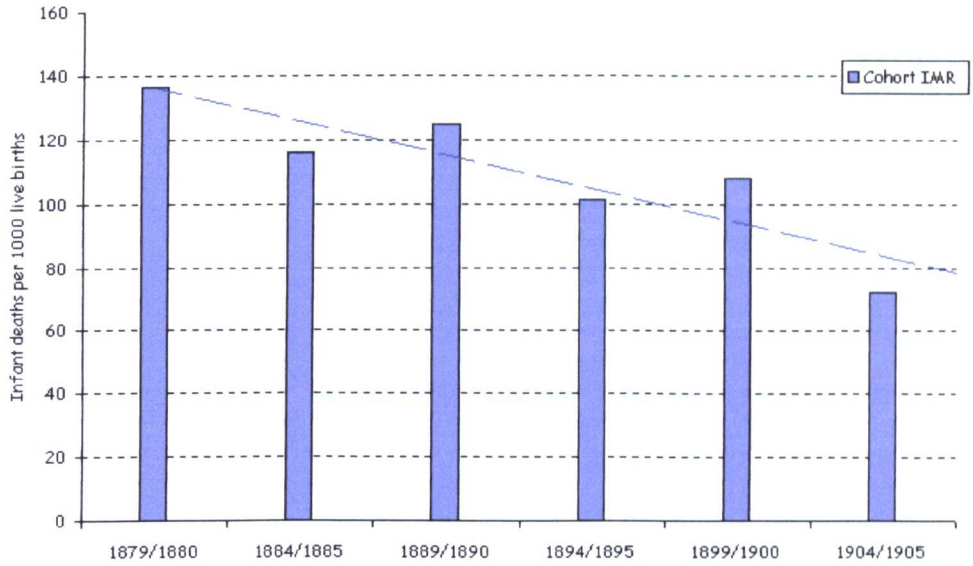
5:2 Urban – rural effect in infant mortality

To establish what impact urbanisation had on the infant experience within the sub-district, the mean of each pair of consecutive years was used to improve the robustness of the data; especially necessary when analysing the infant experience in the rural parishes because there the number of infants was very small (Figure 5:2). The resulting pattern was less detailed than that seen previously, but the increases in rate in 1889/1890 and 1899/1900 were still *evident,* although that at the end of the 19th century was less clearly defined.

[2] See Chapter 3 for a fuller discussion of this issue.

3 This finding and its implications will be discussed more fully in an exploration of the factors influencing individual infant deaths in Chapter 7.

Figure 5:2. *Cohort IMR for Higham Ferrers, 1879 - 1905*[4]



	1879/1880	1884/1885	1889/1890	1894/1895	1899/1900	1904/1905
Births	717	879	1011	1275	1528	1283
Deaths	98	102	126	129	165	93
IMR	138.68	116.04	124.63	101.18	107.98	72.49

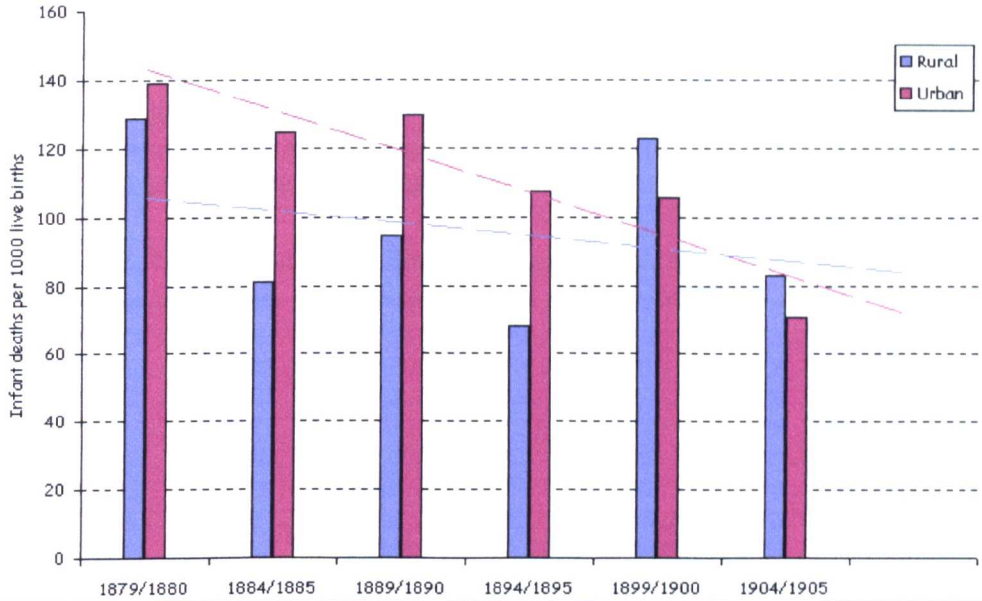
Source: CVRs

When the cohort IMRs for the rural parishes were compared with those of the towns, the pattern of infant mortality was similar. The urban rate was higher until the end of the 19th century, but in 1899/00 the infant mortality rate in the rural parishes rose above that in the towns (Figure 5:3). This rise in rate in the rural parishes was unexpected, as the evidence from the majority of authors including Newman (1906), Woods et al (1988) and Williams & Galley (1995) indicate that the peak in rate at the end of the 19th century was predominantly the result of an increase in epidemic diarrhoea in the summer months in the major cities. Whilst this may have been a factor in the urban parishes in 1899/1900, the same seems unlikely to be true of the rural villages.

In Higham Ferrers in 1899/00, the cohort IMR in the urban parishes decreased very slightly from 108:1000 in 1894/95 to 106:1000, but in the rural parishes the rate rose substantially from 68:1000 to 123:1000 – an increase of 55:1000, confirming that the 'peak' seen at the end of the 19th century was a rural, rather than an urban phenomenon. This is in contrast to the evidence from Millward & Bell (2001), who suggest that rural areas experienced a continuous decline in IMR due to the absence of diarrhoea and that in general in the late 1890s, there was a decrease in IMR of 5:1000 compared to a rise of 20 – 30:1000 in the urban settings. When the actual numbers of births and infant deaths are analysed, it is seen that whereas in the years 1894/1895, there were 5 times as many births in the urban areas than in the rural parishes, there were 8 times as many deaths. In contrast, in the years 1899/1900 there were 6.5 times as many births and only 5.6 times as many deaths. This was the only occasion in the joint years studied that this pattern was seen, but, as with the other joint years the difference between the urban and rural cohort IMR was not statistically significant. There would seem to be little doubt however, that the

[4] The data for the years 1909 and 1910 were transcribed, but omitted from the remainder of the study because the data for 1910 was incomplete.

Figure 5:3. *Comparison of urban and rural cohort IMR in Higham Ferrers, 1879 - 1905*



	1879/1880	1884/1885	1889/1890	1894/1895	1899/1900	1904/1905
Urban [i]						
Births	546	706	863	1070	1325	1102
Deaths	76	88	112	115	140	78
IMR	139.19	124.65	129.78	107.48	105.66	70.78
Rural [ii]						
Births	171	173	148	205	203	181
Deaths	22	14	14	14	25	15
IMR	128.65	80.92	94.59	68.29	123.15	82.87

i Urban = Rushden; Higham and Irthlingborough
ii Rural = Irchester, Farndish, Newton, Podington and Wymington

Source: CVRs

survival chances of infants born in the rural parishes in 1894/95 and 1899/1900 were different. The number of births in each period was similar (205 and 203), but the deaths in 1899 /1900 were nearly double those in 1894 /95 (14 and 25) and although this difference was not significant possibly due to the small numbers involved, the difference in deaths between the cohorts was remarkable.

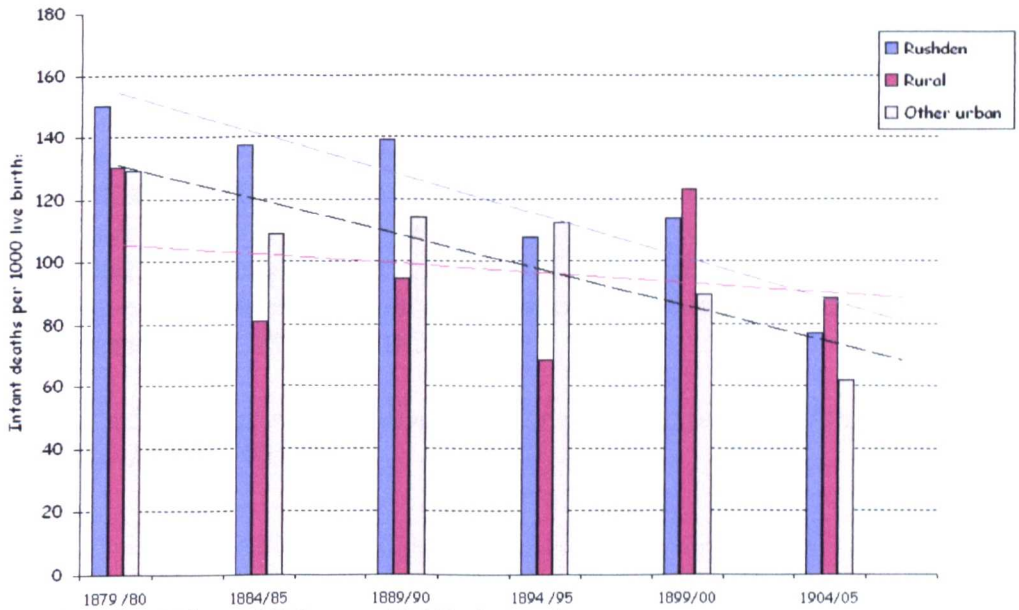
Williams & Galley (1995) indicate that the decline in IMR in the urban areas was precipitous after 1900, compared to that in the rural areas where the rate declined more slowly, and by the first decades of the 20th century the urban rates were lower than those seen in rural areas. In the parishes of Higham Ferrers, the pattern of decline of the urban and rural parishes were similar to that found by Williams and Galley, although the urban rate was found to be lower than the rural rate between 1900 and 1905 (Figure 5:3).

The population of Rushden increased rapidly over the period from 1881 to 1911, in contrast to the other parishes of the sub-district, enhancing the size differential (Table 4:2). Using data from the CVRs, it was possible to calculate cohort IMR for the individual parishes to identify if there was a correlation between population size and infant death rates (Figure 5:4).[5]

5 The rural parishes included Farndish, Irchester, Newton, Podington and Wymington. The 'other urban' parishes were Irthlingborough and Higham. Allocation to each group was based on status following the 1894 local government re-organisation.

When the infant birth and death statistics of individual parishes were analysed, patterns were seen to differ significantly. The rate of cohort infant mortality, during the period studied, was highest in Rushden until the mid 1890s, but in 1894/95 the Rushden rate decreased and became similar to that found for Irthlingborough and Higham. The population growth during this period in Rushden had been immense; far greater than that seen elsewhere in the sub-district, indicating that population growth alone was not influential in infant mortality rates (Figure 5:4).

Figure 5:4. *Comparison of cohort IMR in Rushden with that of the other urban parishes [i] and the rural villages in Higham Ferrers 1879 – 1905*



i Other Urban = Higham and Irthlingborough

ii Rural = Irchester, Farndish, Newton, Podington and Wymington

Source: CVRs

In Rushden, apart from a blip in IMR during the peak years of 1889/1890 (so slight that it was hardly noticeable), and again at the end of the 19th century, the overall trend in IMR was down - more so than that seen in the other towns (Figure 5:4). The IMR in Rushden, moved from 150 deaths per 1000 live births in 1879/80 to 77:1000 in 1904/05 - an overall decline of 73:1000. In Irthlingborough the decline over the same period was 65 infant deaths per 1000 births and in Higham the rate decreased from 140:1000 to 70:1000, in 1904/05. In itself this is unremarkable, but as seen earlier, the decline in Rushden was against a background of rapid population growth of 664 % over the period from 1871–1911, compared with one of 157% for Irthlingborough and 137% for Higham. In contrast to the situation in Rushden and the other towns the downward trend in infant mortality in the rural parishes was not nearly so steep and the trend-line crossed that of the other urban parishes in 1894 /1895 and that of Rushden before 1904/1905. In part this may have resulted from the high IMR seen in 1899 /1900 compared to the other parishes.

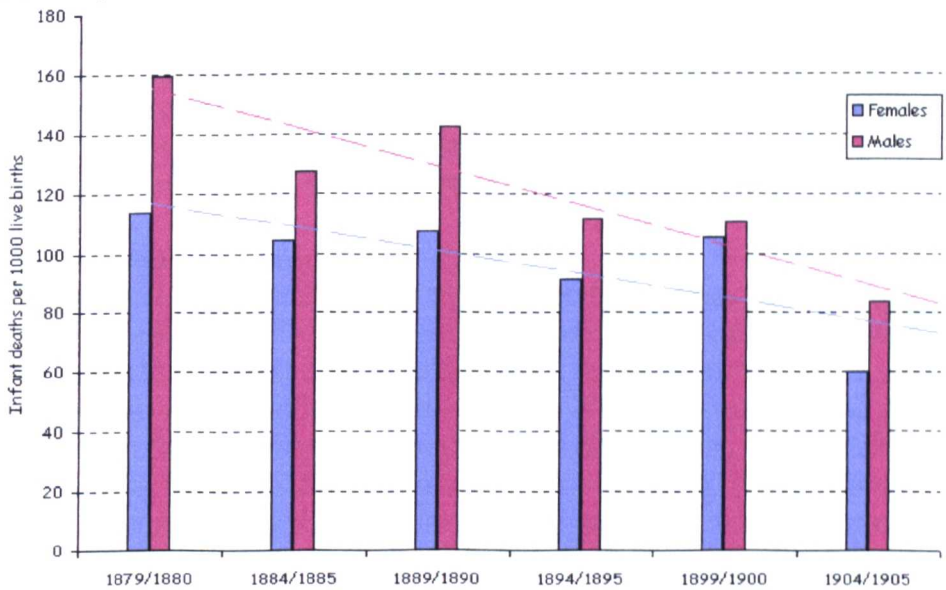
It would seem therefore that, as with the sub-district as a whole, either population per se was not an influencing factor in infant death within Rushden, or the influences detrimental to the infant improved at a greater rate than those in the other towns of the sub-district. The lack of a significant increase in IMR in the closing years of the 19th century in Rushden may also have resulted, as indicated by Williams and Galley (1995), from the ability of the Rushden Urban District Council (RUDC) to limit the impact of the environment on the infant during the summer months.

Despite the improvement seen in the town by 1900 there is little doubt that the situation for infants at the beginning of the period studied was worse than that for infants born elsewhere in the sub-district. Several factors may have been influential such as overcrowding, the disease environment and the lack of clean water. In addition illegitimacy, multiple births, male sex and the vulnerability of the neonate have also been implicated as impacting on the infant experience. A greater proportion of any of these would therefore adversely impact on the Rushden IMR.

5:3 Gender influences on infant death

From 1880 to 1905 the cohort IMR for male infants in the sub-district was higher than that for females whereas the ratio of males to females was very similar, supporting the findings of authors such as Woods et al (1988) and Reid (2001) (Figure 5:5). The difference in mortality was found to be statistically significant ($p=<0.01$). The short term peak at the end of the 19th century was not visible for male infants, whereas that for females is clearly demonstrated in Figure 5:5, indicating that whatever the conditions were that brought about this rise in IMR, they impacted more on females than male infants. According to Woods & Shelton (1997:33) the mortality for girls from whooping cough and measles exceeded that of boys and as epidemics of both were prevalent in Rushden in 1898 these may have contributed to the increased numbers of deaths of infant girls during the first quarter months of 1899 (RUDC 1898).

Figure 5:5 *Comparison of cohort IMR for male and female infants born in Higham Ferrers, 1879 – 1905*

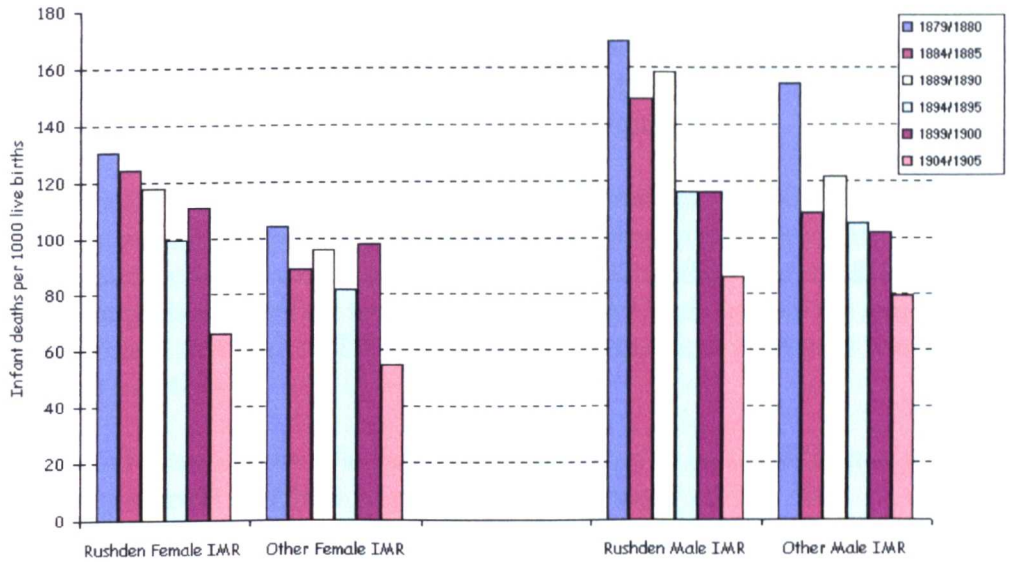


Source: CVRs

The downward trend in IMR was also steeper for male infants than for female infants, possibly attributable to the rise in female IMR at the end of the 19th century. It may also be that the environment grew less hostile than it had previously been for male infants. When the rates for males and females born in Rushden were compared with those born in the other parishes it was seen that the proportion of males to females was similar to that of the sub-district as a whole, with approximately 50% in each cohort in the years studied. For both males and females the mortality rate for Rushden-born infants was higher than in the other parishes in all years (Figure 5:6). The rise in female IMR in the years at the end of the 19th century was seen throughout the sub-district; in contrast to males, for whom the peak in rates was not seen. In contrast the 1889/1890 peak in IMR was evident among male infants and only female infants born in the other parishes of the sub-district rather

than those born in Rushden.

Figure 5:6 *Comparison of cohort IMR for females and males in Rushden with those in the other parishes of Higham Ferrers, 1879 – 1905*



Source: CVRs

The difference between the mortality rate of males born in Rushden and those born in the other parishes was not statistically significant, from which it can be assumed that the factors influencing the life chances of males affected all equally, thus diminishing the 'Rushden effect' seen in other situations. What the factors were that militated towards higher rates of mortality among male infants born in the sub-district is not evident from the data, but it is known that male infants are more vulnerable during the first month of life because of lower birth weight (Reid 2001).

5:4 Neonatal Mortality

Within much of the literature on infant mortality, neonates as a group are usually discussed in combination with the infant under one year, rather than as a separate entity. In part, this is because the national data, breaking down age at death under one year into specific age groups, was not formally reported until the 1905 Registrar General's Annual Report. The term 'neonatal mortality' referring to infant death during the first 28 days was used for the first time by the Registrar General in 1938 (Armstrong1986). Subsequently this period was further sub-divided and 'early neonatal mortality' was used to refer to infant deaths occurring during the first week and 'late neonatal mortality' to those deaths occurring 8 – 28 days after birth. In 1948, Peller described the close link between stillbirths and first week deaths as 'perinatal' mortality – a term first used by the Registrar General in the *Statistical Review* of 1951 (in Armstrong 1986). The need for a differential classification of infant death arose at the beginning of the 20th century, when attention became focused on deaths in the first month. This was because, in contrast to the declining rate of deaths of older or 'post-neonatal' infants, neonatal mortality rate remained stubbornly high (Williams and Galley 1995).

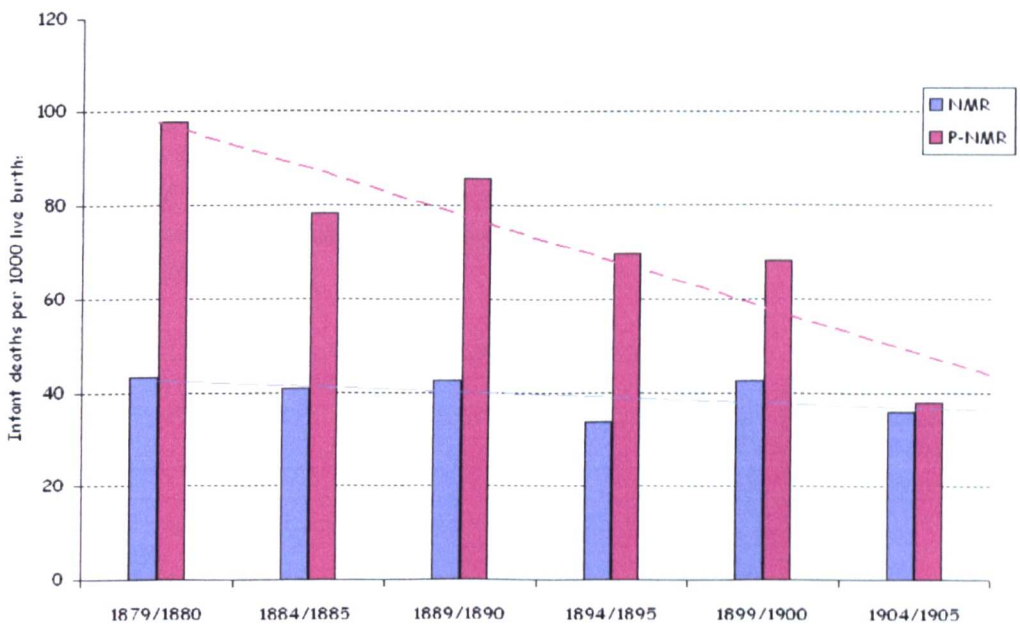
The vaccination registers for the sub-district provide actual dates of birth and death and therefore reasonably accurate age at death information.[6] The neonatal mortality rate (NMR) remained virtually unchanged between 1879 and 1905 at approximately 40 deaths

[6] As all infant deaths that occurred before vaccination were recorded, the data for calculating neonatal mortality is considered to be reliable. See Chapter 3 for further information on the source data for this study.

per 1000 live births, whilst the post-neonatal mortality rate (P-NMR) fell. (Figure 5:7). Although there is no published data set against which to compare the Higham Ferrers results, Wrigley (1998) theorised that the neonatal mortality rate remained relatively constant throughout the latter part of the 19th century, at 20 to 30 neonatal deaths per 1000 live births, whereas Galley and Woods (1999) adjudged the neonatal mortality rate to be at approximately 22 per 1000 in 1906. Millward & Bell (2001) on the other hand indicate that the neonatal rate during the 50 years preceding the First World War averaged 40: 1000 – a rate similar to that found in Higham Ferrers (Figure 5: 7).

The variations in calculated rates for national neonatal mortality occurred because there was an absence of reported national data, resulting in the use of different localised sources. Local rates however varied significantly as illustrated by Garrett & Davies (2003), who, in their comparison of infant and neonatal mortality rates in Ipswich and Skye during the 1880s, found that whilst NMR was 37:1000 in Ipswich, in Skye it was nearly twice as much at 67:1000.

Figure 5:7 *Comparison of cohort neonatal mortality rate (NMR) and post-neonatal mortality rate (P-NMR) in Higham Ferrers between 1879 – 1905*



Source: CVRs

The percentage of infant deaths occurring in the neonatal period in the sub-district increased steadily from 1879 -1905 as the post-neonatal mortality fell and by 1899/1900 accounted for approximately 40 % of all infant deaths: a result similar to that of Galley and Woods (1999). They found in their work that by 1906 neonates accounted for 50% of all infant deaths, however Newman (1906) suggested that only 30% of infant deaths occurred in the first month and 55% in the first 3 months.

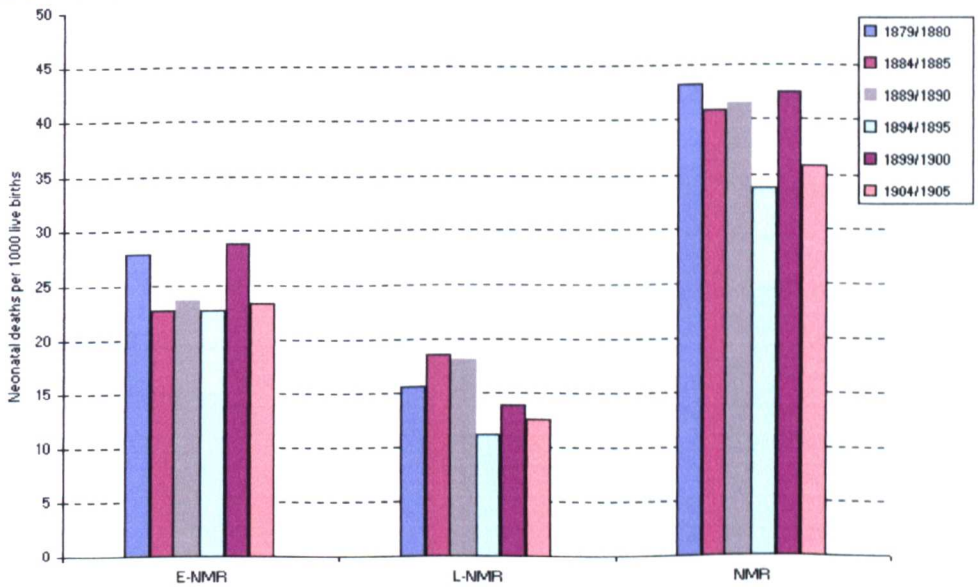
Unlike overall infant mortality, which declined over the period studied, the neonatal mortality rate remained at between 33 and 43 neonatal deaths per 1000 live births, supporting the findings of Wrigley (1998), who indicated that neonatal mortality only began to decline with the introduction of maternal health and welfare services at the beginning of the 20th century. Millward & Bell agreed, indicating that NMR '*showed no signs of long term decline before the 1930s*' (Millward & Bell 2001:706). Hart (1998) suggested, that not only did NMR not decline, but instead it rose throughout the 19th

century in the UK. This, according to Hart contrasted with the situation in Denmark, where the NMR fell from 45:1000 in the mid 19th century to 24:1000 in 1900.

The peak in infant mortality seen previously in 1889 /1890 in the sub-district reflected only a tiny rise of 1.5% in neonatal mortality compared to 21% in post -neonatal mortality (Figure 5:7). This would suggest that the factors that brought about a rise in infant mortality at this time were confined largely to the older infant and therefore probably exogenous in origin.[7]

The peak seen in IMR in 1899/1900 was different, in that it appears to be wholly attributable to an increase in neonatal deaths, rather than deaths of older infants. The NMR rose from 34:1000 in 1894/1895 to 43:1000 in 1899/1900 an increase of 8.9 deaths per 1000 live births compared to a decrease in P-NMR of 2:1000. In much of the literature the national rise in infant deaths during the late 1890s is attributed to environmental influences, notably long hot dry summers which brought about a surge in deaths due to summer diarrhoea (Woods et al 1989; Williams & Galley 1995). There would not appear from the literature, however, to be any indication that the rise was brought about by an increase in neonatal deaths, as it apparently was in the sub-district.[8] It may, of course, have been the case that the infants born in Higham Ferrers, died of summer diarrhoea in the late neonatal period, but when the data was recalculated to identify early neonatal and late neonatal deaths, it was seen that the mortality rate for those dying in the first week after birth was also raised and diarrhoea was thought to be an unlikely cause of death for these infants (Figure 5:8).

Figure 5:8. *Comparison of the rate of early neonatal mortality (E-NMR)*[i] *with that of late neonatal mortality (L-NMR)*[ii] *and overall Neonatal Mortality Rate (NMR) in Higham Ferrers, 1879 – 1905*



i E-NMR = Deaths of infants aged 1 – 7 days per 1000 live births
ii L-NMR = Deaths of infants aged 8 – 28 days per 1000 live births

Source: CVRs

[7] This issue will be discussed further in Chapter 8

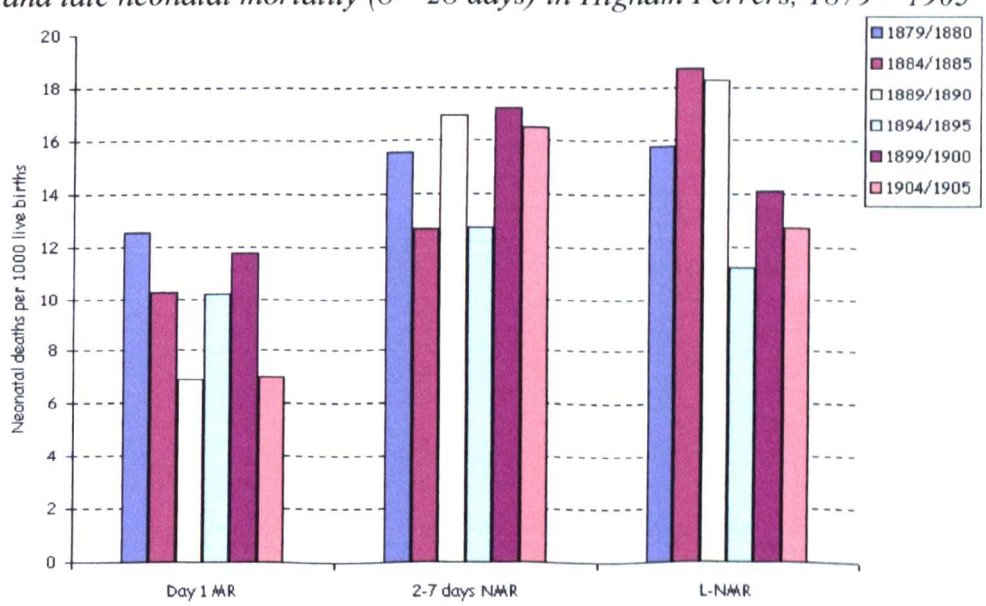
[8] These figures however only relate to a two year period and a more extensive exploration of other years is needed to confirm this finding, because it may have been part of a trend that started earlier As noted above the vaccination birth registers for 1897 / 1898 are missing.

The increase in the rate of mortality for the very young infant was greater than that for the infant who survived the first week and therefore other factors may have been operating to the detriment of the newborn, such as maternal factors resulting in premature birth (Newman 1906). In 1898, the year before the increased rate in early neonatal deaths seen in this study, the MOH for Rushden had reported that of the 84 infant deaths in the year "*twenty six deaths were of children prematurely born and consequently weak, some living only from 5 minutes to a few hours and could not be said to be due to any preventable cause*" (Rushden Echo 1898).

After the decrease in L-NMR in 1894/1895 the rate remained much lower overall than previously and remained so for the rest of the period studied, apart from the slight peak in 1899/1900. At this point in time there is no explanation for this phenomenon and further study would be required to explore this issue. It may be however that the cause of death for the older neonate may have been exogenous in origin and therefore the factors that brought about the decline in post-neonatal deaths in Higham Ferrers, also impacted on the older neonate. In contrast the situation for the newborn continued relatively unchanged apart from the short term peak in 1899/1900, presumably because the endogenous factors, which impacted on the survival chances of the neonate in the first week, did not decrease.

As a result of the higher rate of first week infant deaths at the end of the 19th century, the decline in early-neonatal mortality rate (E-NMR) over the period studied was minimal, in contrast to infant death at others ages, where the decrease over the period was marked (Figures 5:8). This would suggest that it was deaths in the first week that were the cause of the static neonatal rate seen in Figure 5:8, rather than deaths during the late neonatal period, but the numbers involved were very small. Further exploration of the data revealed that the pattern of deaths for the infant dying on the day of birth (newborn) also differed from that of those dying during the first 2 – 7 days (Figure 5:9).

Figure 5:9. *Comparison of the rate of first day mortality rate with 2-7 day mortality rate and late neonatal mortality (8 – 28 days) in Higham Ferrers, 1879 – 1905*



Source: CVRs

For the infant who survived the first 24 hours, the pattern of mortality showed a peak in 1889/1890 and slightly above this in 1899/1900 (Figure 5:9). From 1894/1895, E-NMR exceeded that of L-NMR whilst the decrease in L-NMR from 1894/1895 seen in Figure 5:8, was not seen amongst those who died during the first week. Contrary to the pattern of

mortality seen for the newborn and the infant who survived the first week the trend for this group of infants (aged 2 – 7 days) was upwards.

The annual numbers of deaths per joint year period were, however, very small for all age groups, with on average only 11 babies dying on the day of birth, and an average of 17 infants aged 2- 7 days and 8 – 28 days, throughout the period studied. The exception was 1899 / 1900 when the number rose in all groups (Figure 5:9; Table 1). During these two years there was a marked increase in births and as 28% were born during the during the first quarter months when it is known that the very young infant is more vulnerable, this may have contributed to the increased mortality rate (Reid 2001).

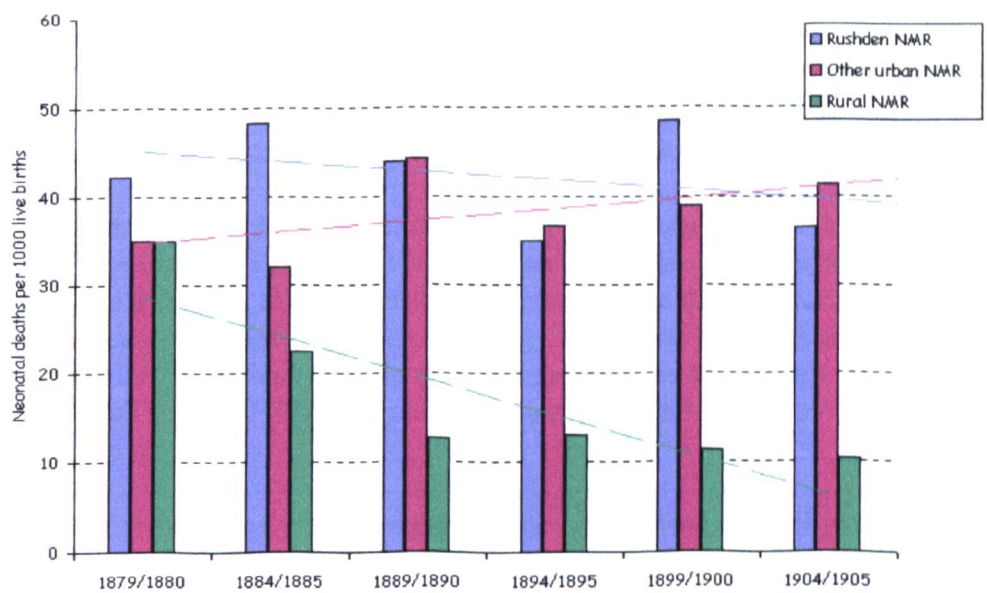
Table 5:1 *Infant births and neonatal deaths during the joint years studied in Higham Ferrers from 1879 – 1905*

	Births	1st day	2 - 7 days	8 - 28 days
1879/80	707	9	11	11
1884/85	879	9	11	16
1889/90	1011	7	17	18
1894/95	1275	13	16	14
1899/00	1528	18	26	21
1904/05	1283	9	21	16

Source: CVRs

According to Millward & Bell (2001) there was little difference in rural / urban rates of neonatal mortality, but when the NMRs for Rushden and the other urban parishes were compared with that for the rural villages, the urban rates were significantly higher in all years except in 1879/1880 (Figure 5:10).[9]

Figure 5:10 *Comparison of cohort NMR in Rushden with that in the urban parishes of Higham and Irthlingborough (Other urban) and with the rural parishes (Rural) of Higham Ferrers, 1879 – 1905*



Source: CVRs

[9] The numbers of neonatal deaths were small in the combined rural parishes but sufficient to demonstrate a trend

The NMR in Rushden however decreased over the period from 42:1000 to 36:1000, producing a downward trend indicating that conditions for the neonate were improving, despite the marked short term peak in 1899/1900. Millward & Bell (2001) suggest that this phenomenon, which had been seen elsewhere, might have been the result of improved obstetric facilities in towns - a positive feature of urbanisation. This could have been the case for Rushden, as the facilities within the town grew rapidly in the last two decades of the 19th century. There were at least three doctors in the town with obstetric qualifications and although no record of midwives has been found, it is more likely that they would have been present in Rushden after the 1902 Midwives Act, than in the smaller parishes. On the other hand the NMR in the other urban parishes did not decline but instead rose over the period from 35:1000 to 41:1000 (Figure 5:10).

The short-term peak in the neonatal pattern of neonatal mortality in 1889/1890 was the result of rising NMRs in the other urban parishes as the rate declined in both Rushden and the rural parishes. The post-neonatal rate in Rushden was however largely responsible for the peak seen in overall IMR in these years. In 1899/1900 the reverse was seen to be true with the rise in post-neonatal mortality caused by a rise in rate in the rural parishes (Figure 5:10). The main factor in the rising IMR seen in the sub-district during these years was a rise in NMR largely a feature of a rise in rate in Rushden, accompanied by a minimal rise in the other urban parishes.. The latter rise provides support for the view that the increase in infant death was urban in nature (Newman 1906; Woods & Shelton 1997:47), but in Rushden it related to the neonate rather than the older infant. The NMR in Rushden rose from 35:1000 in 1894/1895 to 48.4:1000 in 1899/1900: a difference that was not however statistically significant. In the other parishes the rate rise was less dramatic - from 37:1000 to 39:1000.

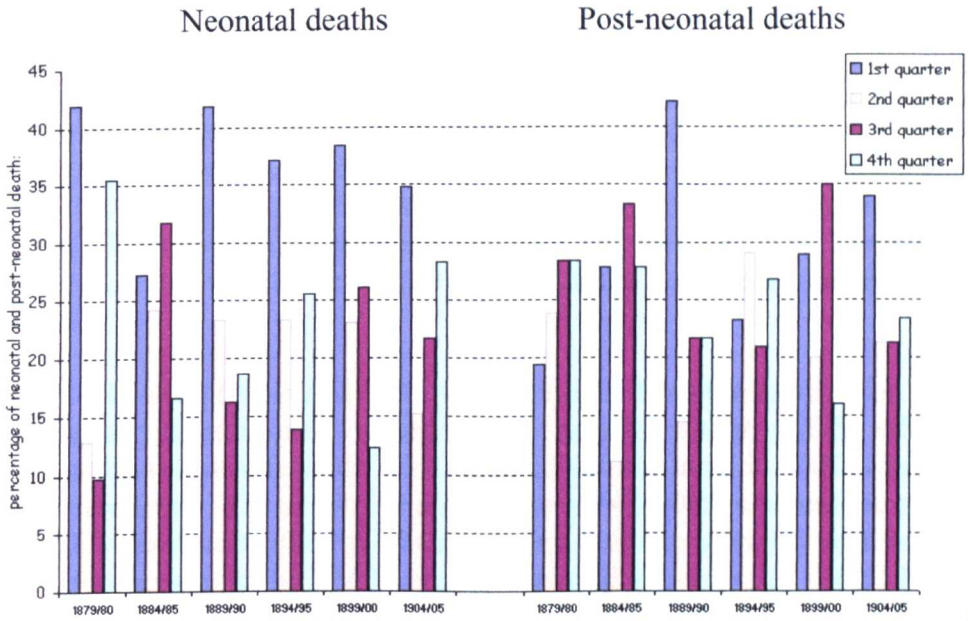
It was not possible to determine the trends in E-NMR and L-NMR for individual parishes because of the small numbers involved. It was found though, that on average the percentage of deaths that occurred during the early neonatal period was similar across the sub-district, with slightly more in Irthlingborough and Higham (25%) compared to Rushden (23%) and the rural parishes (22%). First day deaths accounted for a slightly higher proportion of infant deaths in the rural parishes (11%) over Rushden (9%) and Higham and Irthlingborough (8%). These figures would suggest that the higher rate of NMR in Higham and Irthlingborough resulted from influences during the first week of life, rather than on the day of birth. A review of the MOH reports for individual parishes might have been informative, but none were available for this area for this period.

Using percentages per quarter, it was seen previously, that the infant in Higham Ferrers was more likely to die in the 1st or 4th quarters of the year. The situation for the neonate was little different, except that for the newborn, the cold winter months of January to March were far worse, much as found by Reid (2001). Deaths were significantly higher in the sub-district in these months in all years recorded apart from 1884/1885, when over a third of all neonatal deaths occurred during the summer months of July - September (Figure 5:11).

It was seen previously, that during the short-term peak in IMR at the end of the 19th century, the highest percentage of infant deaths occurred in the first quarter months rather than in the summer as experienced elsewhere. When neonatal and post–neonatal deaths were reviewed separately, it was found that there was a difference in seasonality of deaths, with the highest percentage of neonates dying in the first quarter (38%) compared to 35% in the 3rd quarter for post-neonatal infants (Figure 5:11). The higher percentage of post-neonatal infants dying in the 3rd quarter months adds weight to the argument that for those

infants who survive the first month, the short-term peak in deaths at the end of the 19th century resulted from summer diarrhoea.

Figure 5:11. *Comparison of neonatal deaths per quarter with post-neonatal deaths Higham Ferrers, 1879 – 1905*



Source: CVRs

Due to the method of analysis, this may however have been the result of a mild winter impacting positively on the newborn experience, rather than any adverse factors occurring during the summer months. On the other hand, it was seen in Figure 5:7 that this was also a year when the NMR was comparatively stable at 41:1000, compared with P-NMR and IMR, both of which exhibited a decline. It could be therefore, that there were factors adversely impacting on the newborn experience – thus reducing the size of the cohort.

A different pattern was seen however in 1889/1890, with a marked increase in IMR in deaths in the first quarter at all ages - 42% of both neonatal deaths and post-neonatal deaths, indicating that at this time it was adverse influences during the winter months that impacted on all infants. This rise coincided with an epidemic of measles in the town (MOH 1890). Due to the small numbers involved, exploration of the urban/rural difference in seasonal effects on neonatal deaths has little validity, but as an indicator, the short term peak in NMR in 1899/ 1900 was higher in Rushden than elsewhere and analysis of percentages of deaths per quarter indicates that 32% of the Rushden neonates who died did so in the first quarter months. In the same year, however the highest percentage of post-neonatal deaths occurred in the 3rd quarter months in the rural parishes.

Conclusion

Using data from the smallpox vaccination registers and the Registrar Generals' quarterly reports it has been possible to compare and contrast the infant experience in the Higham Ferrers sub-district with that at district, county and national level. The pattern of infant mortality in the sub-district was seen to be one of pronounced peaks and troughs including a short term peak at the end of the 19th century, which was absent from the Northamptonshire and Wellingborough Registration District data. In common however with most other places regardless of the level of IMR, the peaks and troughs disappeared and the rate declined steeply from the beginning of the 20th century.

The data gained from the vaccination registers for individual parishes enabled the exploration of the urban rural differences in infant mortality rates, such as that discussed by Woods et al (1989). Despite Rushden being a very small town by most standards, an urban-effect was found in the sub-district, with rates in Rushden higher than elsewhere for most of the period studied. However the rate of infant mortality in the town decreased over the period from 1879 – 1905 despite a massive 664% increase in population, indicating that it was not population growth *per se* that caused high rates of infant mortality. Instead it would appear that urban growth impacted on the infant experience in ways that could not be identified from the sub-district data but which lessened towards the end of the 19th century. The percentage of infant deaths in the first quarter months in Rushden was seen to be higher in most years studied, as it was throughout the sub-district; the exception being 1899/1900 when 3rd quarter deaths were also high (though not as high as first quarter deaths). Exploration of these years revealed the short term peak however to be as much a phenomenon of the villages as the towns with the increase attributable to third quarter deaths.

As actual dates of birth and death were available from the vaccination registers, a comparison of the neonatal experience of mortality with that of the infant who survived the first month was also feasible. This revealed that the trend in NMR was fairly static during the period from 1879 to 1905 at approximately 40:1000, whereas the post neonatal mortality declined markedly. The short term peaks in mortality seen in the pattern of IMR were also present in the NMR pattern of mortality, but that of 1889/1890 was minimal. In contrast the peak in 1899/1900 was seen to result largely from an increase in neonatal mortality, especially in Rushden in the winter months. The overall trend in NMR in Rushden was down compared to the other urban parishes where the rate continued to rise over the period studied. There is no obvious reason for this but it would appear that unlike mortality of the older infant, urbanisation in itself was not a factor in neonatal death, rather that the neonatal period was hazardous for all infants especially those born in the winter months.

Urbanisation in the sub-district due to the industrialisation of the shoemaking industry therefore appears to have impacted on the infant experience with infants born in Rushden faring worse than their rural counterparts both during the neonatal and post-neonatal periods.

The second part of this study aims to explore whether Thomas was right when he blamed the high rate of infant mortality in the sub-district on the *"the conditions of life* [which] *are much what they are in the factory towns where the rate of infant mortality is always high"* (Thomas 1883:6). In order to do this the years from 1880 to1889 have been chosen for study at the level of the individual infant because for Rushden this was the period of greatest change in the industrialisation of shoemaking and as a result, the period of maximum population growth; 103% between 1881 and 1891. The data for this period is also complete and the vaccination registers can be supported with information from the 1881 and 1891 censuses. There is also a full set of Medical Officer of Health reports for the sub-district from 1883 to 1889, although reports for individual parishes were not available until 1891 when the first Medical Officer for Rushden was appointed.

In order to set the exploration in context, the changes taking place in Rushden and the rest of the sub-district during the decade will be reviewed, together with the pattern of infant mortality in the sub-district. This will be followed by a discussion of impact of the urban environment on the infant experience, especially the way in which it facilitated the spread of infectious diseases. Maternal factors thought to be influential in the infant experience

during the 1880s will be examined and the impact on infant mortality rates analysed. Finally the infants born in Higham Ferrers will be located within family units, since what happens within the family is thought to be central to infant health and welfare.

Chapter 6. Urban growth and infant mortality during the 1880s

Until the mid 1870s, the small towns and villages of the Higham Ferrers sub-district were unremarkable. Agriculture was the main form of employment, although many families were also involved in shoe making, which was largely a cottage industry. However, during the 1880s, the advent of machinery changed not only the character of shoemaking, through the growth of factories, but all other aspects of people's lives. Unlike the previous home-based industry, factory production meant that work was concentrated in manufacturing centres and many workers moved to the towns, especially Rushden. Rushden grew rapidly and by the end of the 1880s, had a population that was double that of ten years earlier and three times that of the other towns within the sub-district. These changes accentuated the urban–rural differences between the towns and villages of Higham Ferrers, as Rushden changed in character.[1] In this chapter the urbanisation of Rushden and its impact on the environment during the 1880s, will be discussed as a prelude to exploring the influence of these issues on the infant experience.

6:1 Industrialisation and Urbanisation

Two aspects of the industrialisation of boot and shoemaking within the sub-district set it apart from industrialisation in general. Firstly, industrialisation came late in the 19th century, much later than was seen in other manufacturing processes, or indeed in other centres of shoemaking such as Northampton and Wellingborough where the first shoe factories were introduced in1860. Secondly, Higham Ferrers was very rural and the three parishes of any significant size were very small compared to the great industrial towns and cities of the North and Midlands of England. Williams & Galley (1995) define a small town as having a population of 10,000 to 100,000, large towns over 100,000 and rural areas under 10,000, with a population density of less than 0.5 persons per statute acre. However Law's criteria for town status cited in Morris & Rodgers (1993), included a) a population of 2,500, b) a defined centre or nucleus and c) a population density of more than 1 person per acre. Using this latter definition Rushden with a population of 3657 in 1881 and a population density of 1.32 persons per acre in 1881 could be described as urban.[2] The population increased to 7,443 and the population density more than doubled to 2.69 persons per acre by 1891. By 1901 this had risen to 4.50 persons per acre; demonstrating clearly the speed and size of the population growth within the town. In comparison, the population density of Wellingborough, which was greater than Rushden in 1881 at 3.07, was by 1901 less than Rushden at 4.10 persons per acre (Table 4:1).

Despite its initial size, industrialisation in Rushden led to the development of features similar to those seen elsewhere; essentially a lack of adequate resources to meet an expanding population, resulting in overcrowding and a disease environment (Woods and Woodward 1984). According to Sheard & Power (2000:6) "*rapid urbanisation was accompanied by a deterioration in the urban environment... with an increase in pollution, infectious diseases moving from endemic to epidemic proportions and a general decrease in urban life expectancy*". King (1997) in his study of Calverley-cum-Fawsley between 1650 and 1830 found that rural industrialisation also brought with it both competing and compensating influences, especially in the early stages due to the impact of rapid in-migration on the social and physical infrastructure.

[1] For the purposes of this study there were three levels of settlement identified: i) Rushden, ii) Other urban – Higham and Irthlingborough, iii) Rural – Irchester, Farndish, Newton, Podington and Wymington. See Chapter 2 for a fuller discussion of these groupings.

[2] Rushden was given urban status by the Northamptonshire County Council on 7th November 1890 and became a Local Government District

The 103% increase in population of Rushden during the 1880s led to a change in the environmental conditions and was, according to Thomas (1883), a crucial factor in the high rates of infant death within the sub-district. A lack of clean piped water, ineffective sanitation and overcrowding increased the disease pool and enhanced the spread of all infections. Epidemics of measles, whooping cough and other infectious diseases occurred frequently, together with waterborne diseases resulting from poor sanitation.

As well as the changes to the physical environment, the move to factory production also changed the social structure of the town, as the percentage of the male workforce occupied in shoemaking rose from 41% in 1881 to 73% in 1891 (Hall & Harding 1985). The factory owners became the most prominent members of society and were eventually to form the newly created Rushden Urban District Council (RUDC) in 1894. The shoemakers, previously self-employed and freelance, became subject to a new method of working, experiencing in particular the time clock, fixed working days and in some cases fixed wages – although many during the 1880s continued to work on piece rates. The working environment for the men changed from individual workshops, either in the house or garden, to communal working in overcrowded and unsanitary factories. On the positive side, the advent of machinery not only changed the character of shoemaking, but benefited other aspects of people's lives. Employment opportunities escalated, with opportunities not only in shoemaking, but also in other support industries such as trade and house building. New houses were built, trains made transport easier, schools were provided, and leisure activities - libraries, working men's clubs, and football clubs, were introduced for the people (Greenall 2000). As the demand for cheap shoes and boots increased, the opportunity for women and children's employment, often within the home, continued despite industrialisation and the involvement of more men in the process (Hall & Harding 1985).

6:2 Population growth and migration

There is little doubt that the processes of industrialisation and urbanisation in Rushden impacted not only on the town, but on the sub-district as a whole. The urban–rural difference in population growth is clearly demonstrated in Table 6:1, as is the difference between Rushden and the other small towns.

Table 6:1 Population in the towns and villages of Higham Ferrers, 1881 – 1891

	1881	1891	Population Increase	Percentage increase	Babies born 1880- 1890
Higham Ferrers s-d	10,774	15,145	4,371	40.8	5,083
Rushden	3,657	7,443	3,786	102.7	2,315
Higham Ferrers	1,468	1,810	342	23.3	646
Irthlingborough	2,736	2,998	262	9.6	1,060
Urban	**7,861**	**12,251**	**4390**	**55.8**	**4,021**
Irchester	1,699	1,824	125	7.4	621
Farndish	72	84	12	16.7	25
Newton Bromswold	111	146	35	31.5	35
Podington	543	504	-39	-7.2	150
Wymington	488	336	-152	-31.1	186
Rural	**2,913**	**2,894**	**-19**	**-0.6**	**1,017**

Source: 1881 and 1891 CEBs for Higham Ferrers

During the 1880s there was an overall increase of 41% (4,371) in the population of the sub-district with 87 % (3786) of the increase centred on Rushden. The 56% increase in the urban population contrasted with an overall decrease of 0.6% in the rural parishes; a situation commonly found in many rural communities during the last quarter of the 19th century according to Mills (1984). In Higham Ferrers however a major factor in the depletion of the rural population stemmed from the completion of a railway tunnel and viaduct in Wymington earlier in the decade. The rail workers' encampment presumably moved further along the line, so that by 1891 the population had decreased by a third.

It is tempting to suggest that the increase in population in the urban areas, especially Rushden, was brought about at the expense of the villages with people moving to the shoemaking centres for work, but the numbers involved were insufficient to account for the increase. Woods (1996:311) suggests that '*although migration was an important contributor to urbanisation most nineteenth century towns and cities also grew by natural increase*'. He further suggests that of the 182% increase in urban registration district populations between 1841 and 1911, only 31% was due to migration compared to 151% resulting from natural increase. In rural registration districts the gain was significantly smaller at 13%, made up of an 86% gain due to natural increase matched against a loss of 73% due to out-migration (Woods 1996). In both the rural and the urban areas therefore, according to Woods, the percentage increase due to natural increase exceeded that resulting from in-migration. This would not appear to be the case in Rushden, however, where there were 2315 births registered from 01/03/1881 – 28/02/1891 and 2022 deaths; a natural population increase of 293 or 8% of the population growth, indicating clearly that in-migration to the town was an important factor.[3] This compared with an increase in the natural population over the period between the censuses of 1,164 (27% of the total population growth) in Higham Ferrers overall indicating as might be expected, that in-migration was greater in Rushden than elsewhere. These figures do not take into account out-migration, but as will be seen in Chapter 9, the number of families leaving Rushden was less than 5% of the total and in the sub-district as a whole the figure was less than 10%.[4]

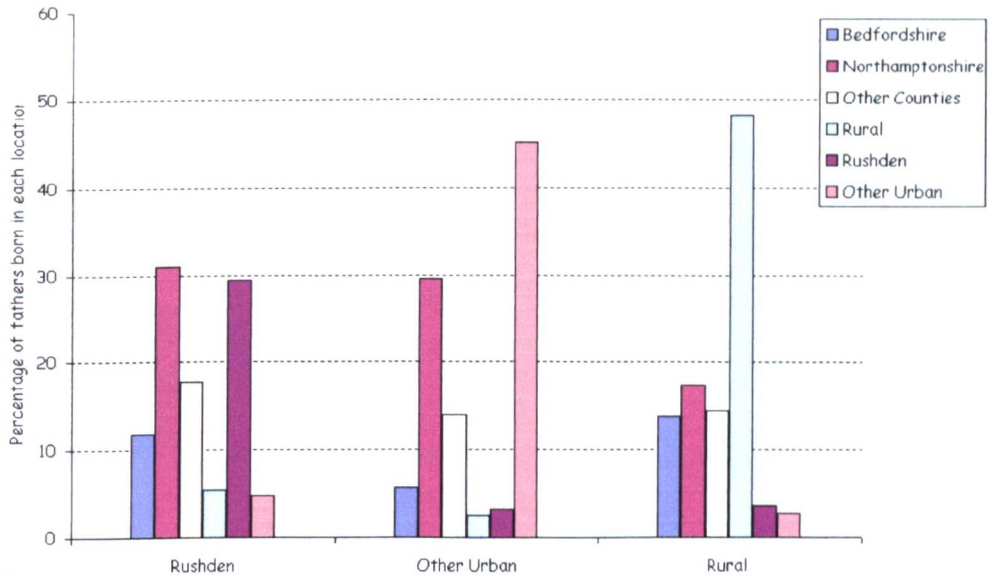
The distance travelled by heads of households whose infants were born in the sub-district during the 1880s, was however minimal, with 34 % having themselves been born in the sub-district; 20% were born elsewhere in Northamptonshire; 7% in neighbouring Bedfordshire and only 12% further away. Of the total number of heads of household, however, there were also 27% transients whose place of birth was unknown because they were not listed in either the 1881 or the 1891 CEBs for the sub-district. In Rushden, of the fathers whose birthplace was known, only 30% had themselves been born in the sub-district compared with 31% born elsewhere in Northamptonshire and 18% in other counties (Figure 6:1).

In the other parishes of the sub-district, the pattern differed from that of Rushden with 45% of fathers in Higham and Irthlingborough and 48% of rural fathers having been born in the same place as their infants (Figure 6:1).

[3] The number of deaths was assessed using the death registration numbers from the infant death registers to identify the total number of persons who died in each parish.

[4] The migrant status of heads of households was determined from a comparison of the 1881 and 1891 CEBs for the areas. Stayers =in both CEBs; Leavers = in 1881 CEBs but not 1891; Incomers = Not in 1881 but recognised in 1891 CEBs; Transients = those who arrived after 1881, gave birth to infants identified in the vaccination birth registers and then left before the 1891 census.

Figure 6:1 *The birthplace of fathers of infants born in Rushden, other urban and rural parishes of Higham Ferrers 1880 – 1889.* [i]



[i] Northamptonshire and Bedfordshire does not include those born within the sub-district parishes

Source: 1881 and 1891 CEBs

As in Rushden, 30% of fathers in Higham and Irthlingborough had been born elsewhere in Northamptonshire, but less (14%) came from other counties. Movement between the parishes of the sub-district appeared limited, although as might be expected from the employment opportunities available in the shoe industry, more fathers moved into Rushden from the other parishes (10%), than moved away (7%). Overall the distance travelled by the majority of fathers migrating to the sub-district was minimal, although it is not possible from the data to determine what moves had been made between their own birth and that of their infants.

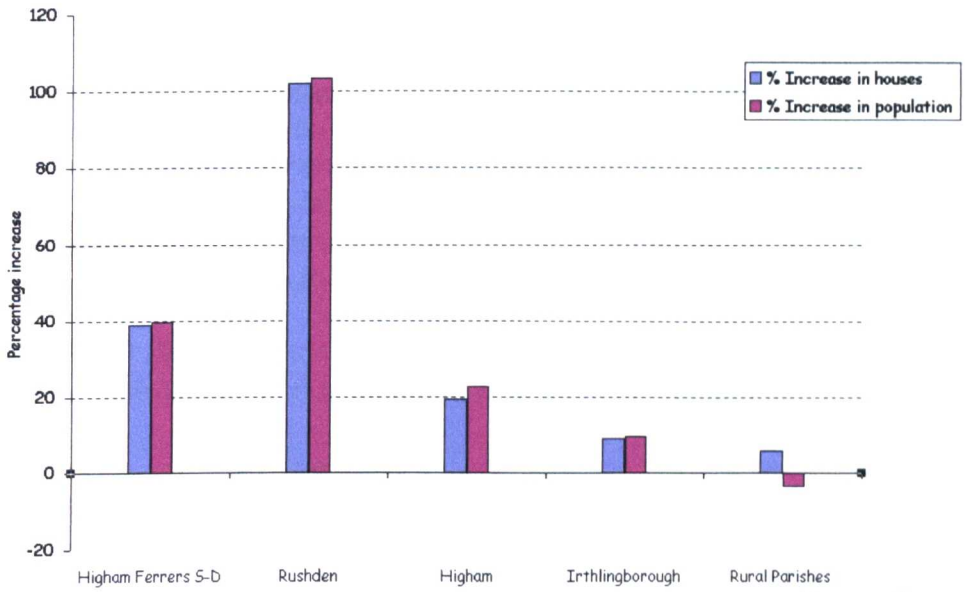
From the 1881 and 1891 CEBs for the sub-district it was found that the percentage of fathers of infants born during the 1880s who were born in counties other than Northamptonshire and Bedfordshire was similar in all occupations: shoemakers – 19%; agricultural workers – 18% and other occupations – 22%. The percentage of shoeworkers (18%) and agricultural workers (19%) who were transient and not found in either census for the sub-district was less than for fathers in other occupations (33%).

6.3 House-building and overcrowding

The expansion in population could well have resulted in severe overcrowding in Higham Ferrers, but the number of houses built during the 1880s matched the growth in population in all parishes apart from the most rural parishes where despite an overall reduction in population the housing stock increased (Figure 6:2).[5] As might be expected, the major building programme took place in Rushden where the number of inhabited houses rose from 723 in 1881 to 1461 in 1891, an increase of 102% (Census Report 1891). In Higham and Irthlingborough the increase in housing stock over the decade was much smaller at 9% and 19% respectively, but again in keeping with population growth.

[5] This did not however lead to a reduction in mean household size.

Figure 6:2 *Comparison of the percentage change in population with that of houses in the parishes of Higham Ferrers 1881 – 1891*



Source: Census Reports 1881 - 1891

As a result of the building programme, the average household size was similar in 1891 to that seen in 1881, with the exception of Wymington, which decreased from 5.8 to 4.5 persons over the decade due to the reduction in the number of lodgers who had previously worked on the railway (Table 6:2).

Table 6:2 *Average household sizes in Higham Ferrers, 1881 and 1891*

	1881	1891
Higham Ferrers sub-district	4.9	4.9
Rushden	5.1	5.1
Higham Ferrers	4.6	4.8
Irthlingborough	4.9	4.9
Farndish	5.1	5.3
Irchester	4.7	4.6
Newton Bromswold	3.8	4.7
Podington	4.2	4.1
Wymington	5.8	4.5

Source: Census Reports 1881 - 1891

In Newton Bromswold, although the number of families remained the same, there was an increase in household size from 3.8 to 4.7 persons as a result of a natural increase. This contrasted with Farndish where the mean household size was 5.1 and 5.3 in 1881 and 1891 respectively; the increase attributable to the increased number of servants in the farmhouses and visitors to the parish.

In Rushden, despite a massive 103% increase in population, the average house occupancy remained static at 5.1, a figure rather higher than the mid-19th century national average household size of 4.6 persons calculated by Anderson (1994), but still significantly lower than that seen in the major industrial towns and cities. Despite the house-building

programme, lodgers or boarders were common, especially in the towns. According to Anderson, lodgers, particularly those who were kin, were a feature of urbanisation as relatives and contacts initially found accommodation in towns with their families or people they knew (in Dennis & Daniels 1984). This finding was supported by information from the 1891 CEBs for Rushden which revealed that 322 (22%) households had at least one lodger listed in the census in the sub-district in 1891 and 12% had kin (Table 6:3). The majority of the lodgers were shoe workers, usually young unmarried men who were born in Northamptonshire, but outside Higham Ferrers. Kin were generally elderly parents or brothers or nephews working within the shoe industry. As with heads of households the majority of lodgers came from outside the sub-district, but were generally born in Northamptonshire. In the rural parishes especially, there were also many grandchildren.

Table 6:3 *Percentages of all households in Rushden, Higham and Irthlingborough and the rural parishes in 1891, which contained lodgers and kin.*

Parish	Households	Lodgers		Kin	
Rushden	1456	322	22%	180	12%
Higham	389	70	18%	66	17%
Irthlingborough	623	41	7%	31	5%
Rural	633	78	12%	99	16%

Source: 1891 CEBs for the Higham Ferrers sub-district

In Irthlingborough, the second largest town within the sub-district, the percentage of households with additional members was much less; 7% had lodgers and 5% had kin (Table 6:3). It is unclear why this should have been since lodgers tended to work within the shoe industry as did the head of household that they stayed with and 51% of heads of households in Irthlingborough were shoemakers. However of the 116 lodgers within the town only half (59) were shoemakers and the rest were professionals such as teachers or medical practitioners, ironstone workers or agricultural labourers. A similar pattern was seen in Higham although the incidence of additional household members was greater. The greatest number of lodgers was seen in Wymington in 1881 with 70 lodgers or boarders found in 26 houses. Only 4 of these did not work on the railway and in the railway huts there were families with 6 – 8 lodgers or boarders such as that of William Martin and his wife Elizabeth. William, a blacksmith, and Elizabeth both came from Nottingham and they had 3 children aged between 1 and 4 years; 2 were born in Nottingham and the last aged 11 months in 1881 was born in Sussex. During the 1880s they had 1 further child born in Wymington in 1882. Also in the house there was a servant aged 17 from Northamptonshire and 6 male lodgers whose birth places included Cornwall, Devon, Sheffield, Northampton and Somerset.

The new housing was largely concentrated in housing estates, especially on the outskirts of Rushden, but all the towns had similar signs of development. In Rushden alone there were 20 new roads adopted during the 1880s. Most of the housing was of the terrace type and was rented to shoe workers for £12 per year, but in common with Sheard & Power's findings in Victorian Britain, they were built to *'meet market demands with little thought of overcrowding or basic provision for sanitary services'* Sheard & Power (2000:6). Certainly the new housing stock initially failed to meet with approval from Thomas (1883) the

Medical Officer of Health for the Wellingborough Sanitary District. In his First Annual Report on the sub-district in 1882, Thomas comments that:

> *"The general character of the cottages, especially those of older construction are in many of your villages not altogether satisfactory. The newer cottages are many of them too slightly built. The builder of many of the cottages appeared to have had little regard for drainage and excrement disposal. In too many instances the cottages have no ground attached to them hence the cesspools are too close to the houses and nuisances are created with the result that the Parish is called upon to remedy them, at least in the larger parishes"* Thomas (1883).

In 1888 *Model Bye-laws* were introduced in Rushden after much haranguing of the Wellingborough Rural Sanitary Authority by Thomas the MoH. He reported that:

> *"87 new houses have been built during the previous year: 53 in Rushden, 2 in Irthlingborough. This year, although the number built at Rushden is 28 less* [than the previous year], *yet it is a large number and one that requires Bye-laws to regulate the way in which they are built. In my report for 1883 I first suggested that model bye-laws should be put in force in Rushden. In my annual report for 1884 I repeated the same thing. I feel sure if the bye-laws were in force they would effect a great improvement. Without them there is no means of insisting on proper house drains"*
>
> Thomas (1887)

As well as indicating how the house should be constructed, the amount of land it should have and directions about the site of cesspools etc., the bye-laws also required that:

- refuse should be removed monthly
- earth closets should be cleansed every 4 weeks
- privies should be cleansed at least once per month
- ash pits should be emptied and cleansed on a regular basis - at least once a month.

Thomas also advocated a 20 shilling fine for defaulters. It is not known how effective these measures were but there seems little doubt that he thought they were of value. Again he comments in 1887 that: *"Bye-laws will have a beneficial effect on the health and comfort of the people – especially the working classes. I should like to see these bye-laws in place throughout the District"* Thomas (1888)

6.4 Water and sanitation

Bell and Millward (1998) indicate from their study of public health measures in 36 towns at the end of the 19th century that the introduction of a clean water supply preceded effective drainage. This they indicated negated the benefit of a clean water supply and it was not until late in the century, when sanitation in England and Wales improved, that the positive impact of clean water was realised. In Higham Ferrers the reverse appeared to be the case with the drainage system introduced 20 to 30 years before there was sufficient water to support it. In a special report on Rushden in 1887 Thomas indicated that the water supply was irregular and dependent to a large extent on shallow wells. He advocated a central water supply and although this was introduced in 1893, it had limited success and it was not until 1906 that the population of the sub-district had access to clean piped water from the Sywell reservoir (Chapter 2). As a result of this, Thomas was adamant that sewerage systems were inadequate and that where water closets had been introduced that they should either be disconnected or have a sedimentary tank fitted and be adequately ventilated (Thomas 1888). In general Thomas recommended the use of the pail system and weekly scavenging for the sub-district. Again however he was adamant that this should take place on a weekly basis not on the *'as needed'* arrangement much preferred by the townspeople! The problem throughout the decade appeared to be that as more houses were built, a greater amount of waste was generated, but there seemed little willingness on the

part of the authorities to make the kind of investment in the infrastructure of the town which would have remedied this situation and make the towns a safer and pleasanter place to live. Owen who became the MoH for Rushden in 1891 reported in much the same way as his predecessor that:

> *"Rushden from the fact of its unreliable and insufficient water supply and its bad drainage is in an unsanitary condition. The water is unreliable coming as it does from shallow wells, which contain surface water, and the drains being inadequately ventilated and only flushed with storm water, allow the sewer gas to escape in a way prejudicial to health. The nuisance in Alfred Street is from this source and was materially aggravated by an overflow from 6 cesspits, which received the contents of nineteen closets. The existence of the cesspits, overflowing closet pails, privies and from their being mostly in a defective condition is a great source of contamination to the well water. All of these defects have been brought to your attention and the existing evils that could be remedied have met with your support. Further efforts should be made to abolish the privies and thereby remove a great source of danger..."* Owen (1892)

These situations were not new as evidenced by a report on an enteric fever outbreak by Dr. Home in Higham in 1871. He concluded that although the enteric fever was due to contamination of the water supply by human waste, the view that the sewerage system was at fault through the escape of toxic gases was unfounded. Implicit in his findings was the belief that the outbreak was due to the poor level of domestic hygiene and the state of the houses, which he described as uninhabitable. He further commented that "*most people (rich and poor) live in houses which are soaked with excrement and all drink contaminated water*" (Home 1871). Such dire situations were not recorded during the 1880s, although Thomas in his reports on the sub-district during the 1880s was nonetheless dismayed at times by the unsanitary nature of the environment.

The 1875 Public Health Act and other legislation clearly established that responsibility for public health lay with local government (Bell & Millward 1998). The effectiveness of this legislation was seen when the RUDC took over in 1894 and the situation changed radically. Within just over a decade, the town was clean, paved and had effective waste disposal systems and clean piped water from the Sywell reservoir. In fact it would appear from the Minute Books that by the beginning of the 20th century the environment had improved to such an extent that the RUDC could spend a considerable amount of time discussing what shape and size rubbish bins should be!

The other urban parishes within the sub-district had similar problems to those experienced in Rushden during the 1880s, although the population growth was less acute and the impact on the environment less severe. Public scavenging was adopted in both Irthlingborough and Irchester, but was not considered necessary for the smaller villages. The drains in Higham remained a problem throughout the period, demonstrating clearly the need to explore the possible impact of innovations.

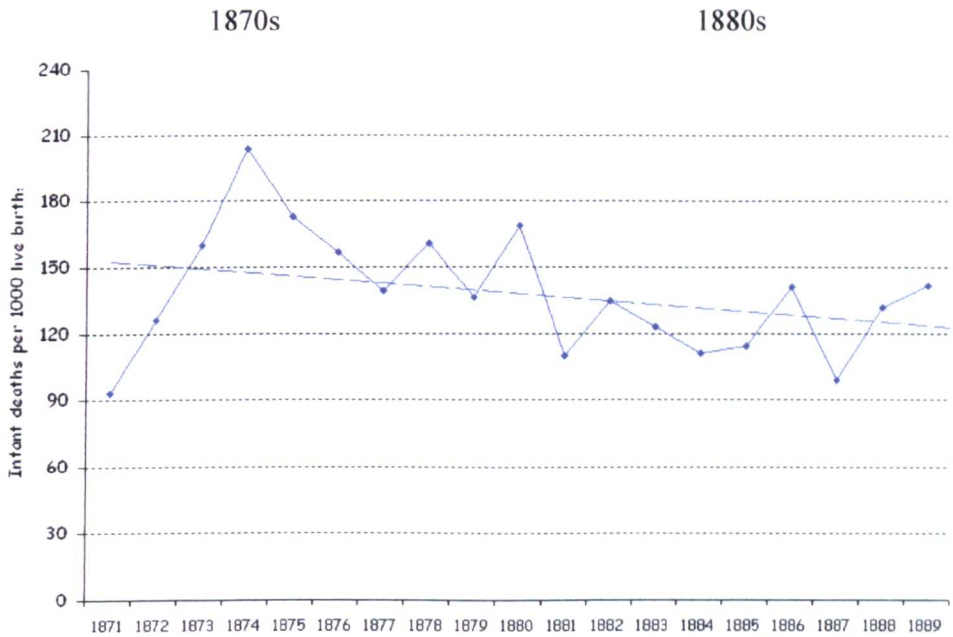
In conclusion the 1880s were a time of change and development in the sub-district. The difference between Rushden and the other parishes was enhanced as Rushden grew rapidly, experiencing concomitant industrialisation and urban growth; changes which had the potential to impact on the infant experience.

6:5 Infant mortality during the 1880s

As seen earlier, the impressions of Thomas, the Medical Officer of Health (MoH) when he surveyed Higham Ferrers in 1882 for the first time were of a rural area where the '*the conditions of life are much what they are in the factory towns where the rate of infant mortality is always high*' (Thomas 1883:6). The standard infant mortality rate in 1882 (the

year on which Thomas was reporting) was 134 deaths per 1000 live births, a rate significantly lower than it had been at times during the previous 10 years (Figure 6:3). The standard IMR was also lower than the rate for England and Wales in all years during the 1880s, with the exception of 1880, when the standard IMR for the sub-district was 169:1000 compared with 155:1000 nationally (Woods et al 1989).

Figure 6:3 *Annual standard infant mortality rate in Higham Ferrers, 1871 – 1889*



Source: Registrar General's Quarterly reports 1871 - 1889

The high rate in 1880 was part of a pattern seen in the 1870s and co-incident with the early stages of industrialisation, supporting King's (1997) views that it was during proto-industrialisation that infant mortality rates were particularly high. On the other hand, Williams and Mooney (1994) found a similar rise during the late 1860s and early 1870s in some towns and cities, which they concluded, may have resulted from environmental factors, similar to those occurring at the very end of the 19th century.

During the period from January 1880 to December 1889 in Higham Ferrers, there were 4547 births and of these infants 544 died before their first birthday - an overall IMR of 119.6 per 1000 live births. Not all infants remained in 'view' until their first birthday, but of those who might be supposed to have survived the first year, 95% (3803) were found in the 1891 census. It was not possible to determine what happened to the remaining 200 infants, but there are several possibilities –

a) it is likely that for some their families moved away from the area before 1891,
b) the mothers of illegitimate infants may have married and they and their children were not detectable in the 1891 census, or
c) as there were some pages in the Rushden 1891 CEB which were illegible, it is possible that some infants were 'lost' to view as a result.[6]

As the infant death registers were available for this period however and provide an accurate account of infant deaths, it would seem unlikely that many, if any, died before their first birthday whilst still living in the sub-district. If those who disappeared from view are removed from the count of births, an infant mortality rate of 143 per 1000 live births is found. As discussed in Chapter 3, this method of calculation does lead to inflated mortality rates, since only infants who die before their family move away from the observed area are

[6] See Chapter 3 for a fuller analysis of using the vaccination registers as a source of data.

incorporated in the data analysis, leading to a potentially higher IMR than would be calculated if all infants were included. The cohorts analysed therefore included all infants born in the sub-district during the identified years, despite the fact that not all could be followed to their first birthday.

When the data from the combined vaccinations registers (CVRs) was compared with that from the Registrar Generals' quarterly reports, the pattern derived from the two sources was reasonably consistent (Figure 6:4). [7]

Figure 6:4. *Comparison of standard IMR derived from the Registrar Generals' quarterly reports with that from the CVRs for Higham Ferrers, 1880 – 1889*

Source: Registrar Generals' Quarterly reports and CVRs

The rate of infant mortality, derived from the quarterly reports, was higher in all years than that calculated using the CVRs, due to the inclusion of the deaths of 42 extra infants over the decade. At least 35 of these may have been infants who moved into the area and subsequently died before their first birthday. They were listed in the infant death registers as '*born away*' and were therefore not included in the data from the vaccination birth registers.[8] In addition, because the quarterly reports were based on the date of registration, the deaths of infants who actually died in 1879, but were registered in 1880, may also have been included.

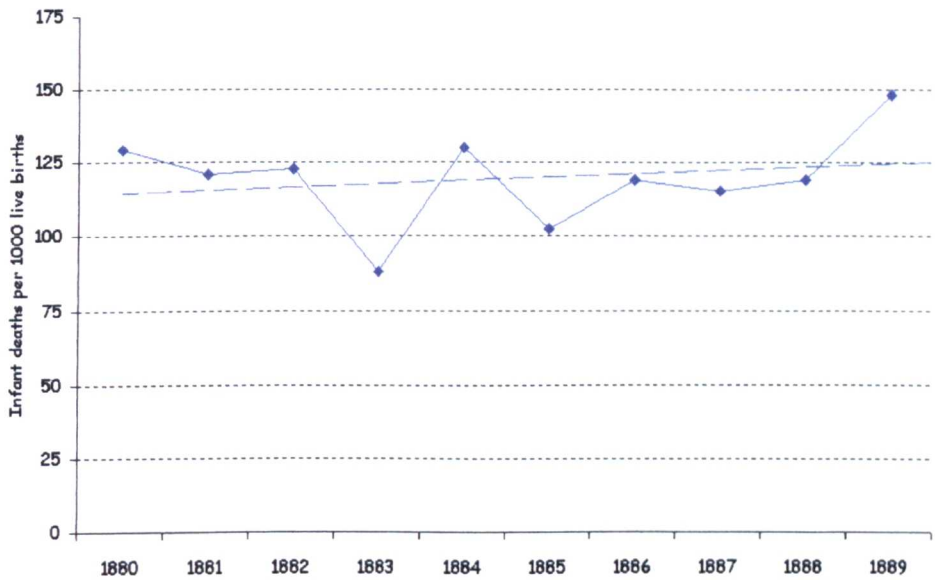
The number of births also differed between the two sources during the 1880s, this time by 15 but as before this is most likely to be due to the difference between actual date of birth and date of registration of birth. The average difference in IMR was 8 infants deaths per 1000 live births, but the difference was much greater in some years, notably 1882 (21:1000), 1883 (13:1000) and 1885 (14:1000). These were the years when the number of deaths of in-migrant infants was highest – 9 born away in 1882, 5 in 1883 and 7 in 1885. In 1881 and 1884 when the IMRs were much closer, there were 2 and 1 infants listed as born away, respectively.

[7] The combined vaccination registers (CVRs) included the smallpox vaccination birth registers and infant death registers.

[8] See Chapter 3 for further exploration of these issues

As a result of the high infant mortality rate in 1880 the trend over the period was down. There was, however, a large number of infants who died in 1880 who were born in 1879 (20) and therefore the pattern produced using the cohort infant mortality rate differed from that of standard IMR (Figure 6:5). The cohort IMR fluctuated between 88 infant deaths per 1000 live births and 148:1000, with evidence of a rising trend. The rising tend was however produced by the larger number of deaths in 1889 and if this year is removed from the calculation the direction of the trend is down.

Figure 6:5 *Annual cohort infant mortality rate in Higham Ferrers, 1880 – 1889*



Source: CVRs

The high IMR seen in 1889 was not repeated and the rate fell to 100 per 1000 in 1890 and of all the years studied, only in 1898 and 1899 did the IMR again rise to the level seen in 1889. There were two years when the dip in IMR was very marked: in 1883 the rate was below a 100:1000 at 88.04, for the first time since 1871 and in 1885 it was 102 per 1000.

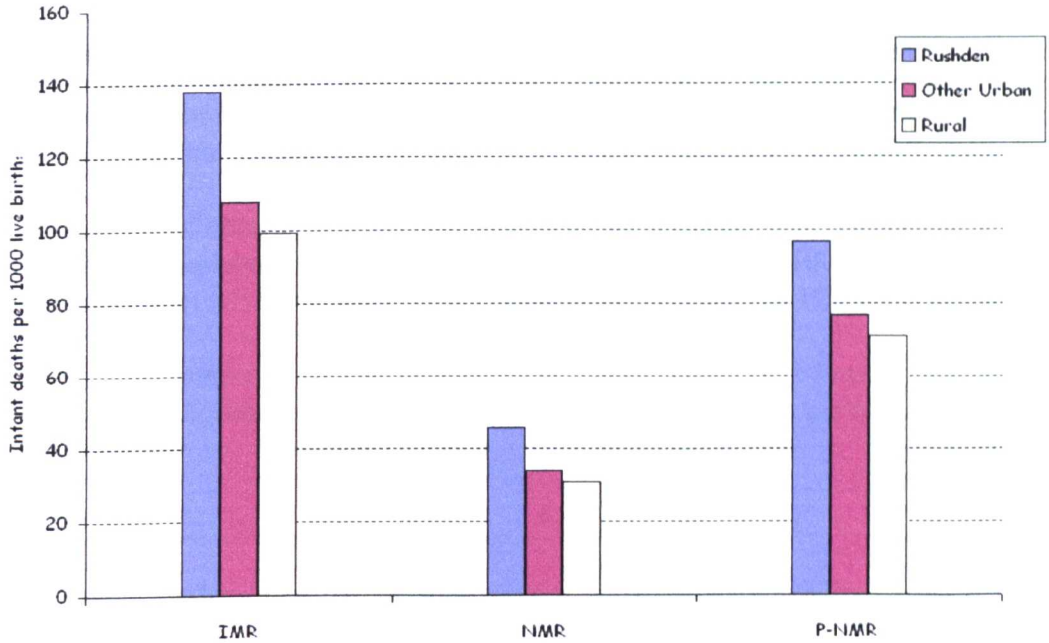
6:6 Rural – urban difference in infant mortality

According to Sheard & Power (2000) living in an urban environment was more hazardous for the infant than those born in the rural areas. This too would appear to have been the case in Higham Ferrers, with both IMR and NMR for the 1880s higher in Rushden than in the rural parishes or even smaller towns of Higham and Irthlingborough (Figure 6:6).

The patterns of IMR for cohorts born in the three different locations within the sub-district were very varied, demonstrating how localised the adverse influences on infants were (Table 6:4). The overall IMR in Rushden for the years 1880 to 1889 was significantly higher ($p = 0.01$), at 138 infant deaths per 1000 live births, than in the other parishes where the overall cohort was 105:1000 (Table 6:4).[9] Similarly the difference in mortality for the neonate born in Rushden was also statistically significant ($p=0.05$) with the NMR in Rushden being 46:1000 compared to 33:1000 in the other parishes. Post-neonatal mortality rate in Rushden at 97:1000 was also significantly higher ($p=0.01$) than that of the other parishes where the P-NMR was 75:1000.

[9] The number of births and deaths over the period were 2036 births and 281 deaths (IMR 138:1000) in Rushden and 2511 births and 263 deaths (IMR –105:1000) in the other towns and villages.
All statistical measures in this study are based on the chi-square test (HAL 1997, Malim & Birch 1997).

Figure 6:6 *Comparisons of IMR, NMR and P-NMR [i] for the towns and villages of Higham Ferrers 1880 – 1889*[ii]



[i] IMR – infant mortality rate; NMR – neonatal mortality rate; P-NMR – post neonatal mortality rate
[ii] Other Urban = Higham and Irthlingborough; Rural = Irchester, Farndish, Newton, Podington and Wymington

Source: CVRs

Table 6:4 *Births and Infant deaths in the parishes of Higham Ferrers1880 – 1889*

	Other Urban [i]			Rural [ii]			Rushden		
	Births	Deaths	IMR	Births	Deaths	IMR	Births	Deaths	IMR
1880	139	12	86.3	86	12	139.5	131	22	168.0
1881	147	18	122.4	117	19	162.4	150	13	86.7
1882	139	18	129.5	129	15	116.3	172	21	122.1
1883	145	13	89.7	107	8	74.8	191	18	94.2
1884	154	16	103.9	81	7	86.4	204	34	166.7
1885	159	18	113.2	92	7	76.1	189	20	105.9
1886	172	18	104.7	80	7	87.5	227	32	141.0
1887	172	26	151.2	91	2	22.0	249	31	124.5
1888	163	9	55.2	86	9	104.7	255	42	164.7
1889	176	21	119.3	76	8	105.3	268	48	179.1
Total	**1566**	**169**	**107.9**	**945**	**94**	**99.5**	**2036**	**281**	**138.0**

i) Urban = Higham and Irthlingborough
ii) Rural = Irchester, Farndish, Newton, Podington and Wymington

Source: CVRs

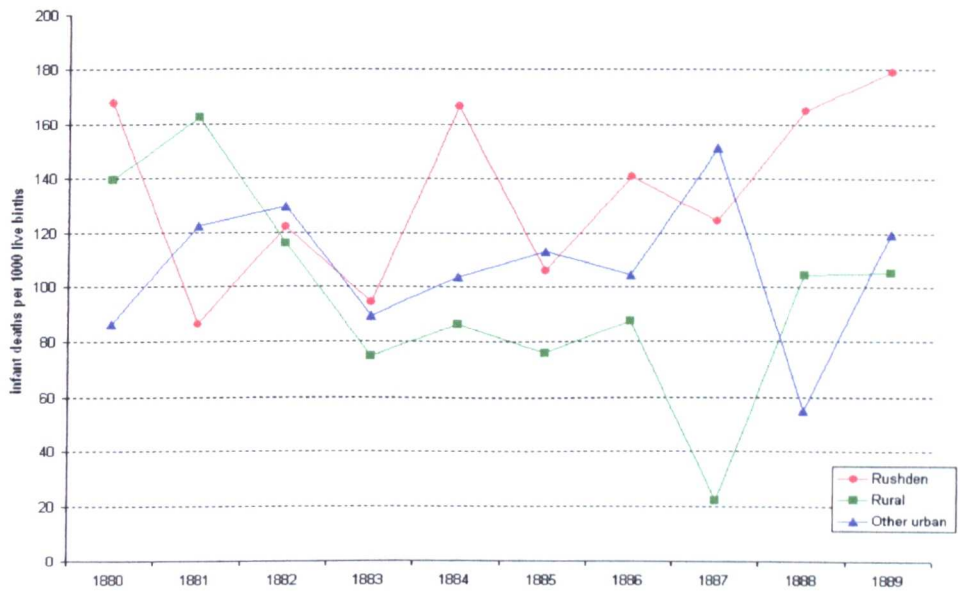
In Rushden the pattern of IMR was characterised by annual peaks and troughs and only between 1888 and 1889 was the trend not reversed. Cohort IMR was very high in 1880 (168:1000), 1884 (167:1000), 1888 (165:1000) and in 1889 (179:1000). In contrast the rate fell below a 100: 1000 in 1881 (87:1000) and 1883 (94:1000).

These dramatic swings in IMR were indicative of exogenous factors such as infectious epidemics, rather than some underlying endogenous influences and were similar to those described by Williams & Galley (1995) in urban settings elsewhere (Figure 6:7).

In the other urban parishes of Higham and Irthlingborough the pattern of infant mortality was much more stable after 1882, with an infant mortality rate of approximately 100:1000 for 4 years before rising to 151:1000 in 1887 and then falling steeply to 55:1000 in 1888 (Figure 6:7). The difference in IMR between Rushden and the other urban parishes in 1888 was highly statistically significant (p=<0.001) which would suggest that the factors responsible for infant death were individual to the parishes, rather than part of a sub-district wide phenomenon.

The pattern of cohort IMR for the rural parishes differed from that of Rushden and the other urban parishes. In 1881 the rural cohort IMR was162:1000 in contrast to the Rushden cohort IMR of 87:1000 and Higham and Irthlingborough of 122:1000 (Figure 6:7).

Figure 6:7 *Comparison of Rushden annual cohort IMRs with those of the other urban parishes of Higham and Irthlingborough and the rural parishes of the sub-district from 1880 – 1889*



Source: CVRs

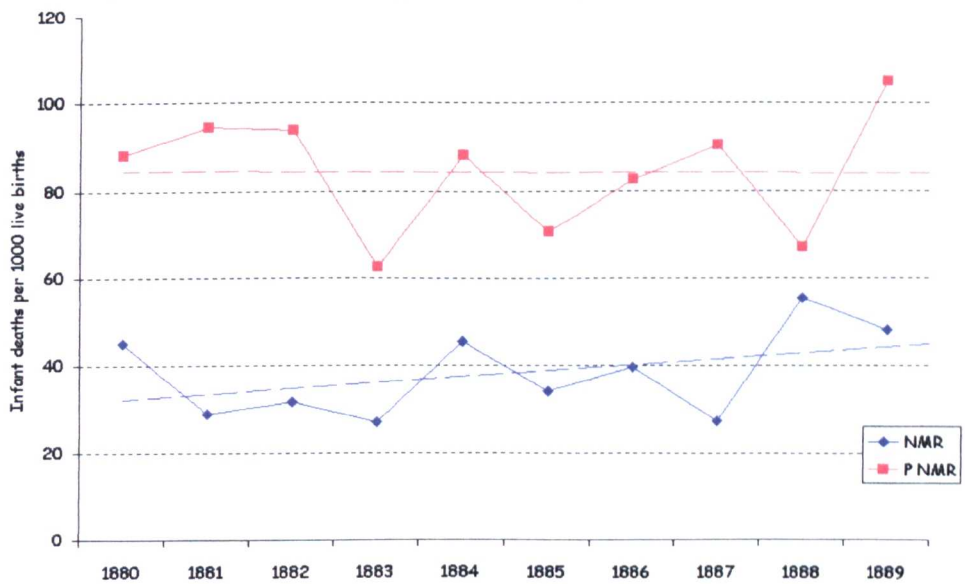
The difference in rate was not however statistically significant as the numbers involved were small. The infants, who died in the rural parishes in 1881, mainly did so in Podington, where 6 of the 21 babies born during 1881 died. There were widespread epidemics of scarlet fever and whooping cough in the Wellingborough District at the time and this may have been a contributory factor (Registrar General's Quarterly reports 1881). In 1887 the rural cohort IMR was exceptionally low for the sub-district at 22:1000 compared to an average cohort IMR of 135:1000 in the other parishes of the sub-district (p=<0.01). There were 91 births in the rural parishes but only two of the infants from the cohort died; Annie Bowen the daughter of a shoemaker in Irchester who died aged 29 days and Eleanor Brooks an illegitimate infant born in Newton Bromswold who died aged 233 days. From Figure 6:7 it would seem that the situation for infants born in Rushden worsened over the decade compared with those born elsewhere in the sub-district and was therefore potentially a feature of urbanisation. Because of the peaks and troughs in rate and the short timescale it was difficult to demonstrate a trend in IMR, but it would appear that the trend in Rushden was one of rising rate of infant mortality compared to the towns of Higham and Irthlingborough, where the rate was static, and the rural parishes where the rate decreased.

6:7 Neonatal mortality

The CVRs not only provided information on infant mortality during the 1880s but also on the age at death during infancy because the actual dates of birth and death are available. It was found that the overall NMR for the years 1880 – 1889 in the sub-district was 38:1000, which was in keeping with that found by Reid (2001) in early 20th century Derbyshire and not as high as that seen by Garrett & Davies (2003) on Skye during the 1880s. The pattern of neonatal mortality demonstrated a series of peaks and troughs, indicating that although death in the first month was largely endogenous in origin, exogenous factors such as infectious epidemics were also influential (Williams & Galley 1995) (Figure 6:8).

The rate was in excess of 45 per 1000 in 1880, 1884 and 1889. In 1888 the neonatal rate rose to 56:1000 but this was seen to be a temporary rise in neonatal death as NMR decreased again to 48:1000 for the cohort born in 1889 and decreased further to 38:1000 in 1890. Whilst the trend for the infant dying after the first month was static despite the high rate in 1889, that for the neonate rose markedly over the decade indicating a worsening of the situation for the youngest infants (Figure 6:8).

Figure 6:8 *Comparison of cohort neonatal mortality rate (NMR) with cohort post- neonatal mortality rate (P-NMR) in Higham Ferrers from 1880 – 1889*



Source: CVRs

In Rushden the pattern of neonatal mortality was also one of alternate peaks and troughs in

rate with exceptionally high rates of 53:1000, 64:1000 and 75:1000 in 1880, 1884 and 1888 respectively. With the exception of 1888 these peaks in NMR were similar to those seen in post-neonatal mortality indicating that the factors influencing the death of the older infant in Rushden possibly impacted on the neonate as well (Figure 6.9).

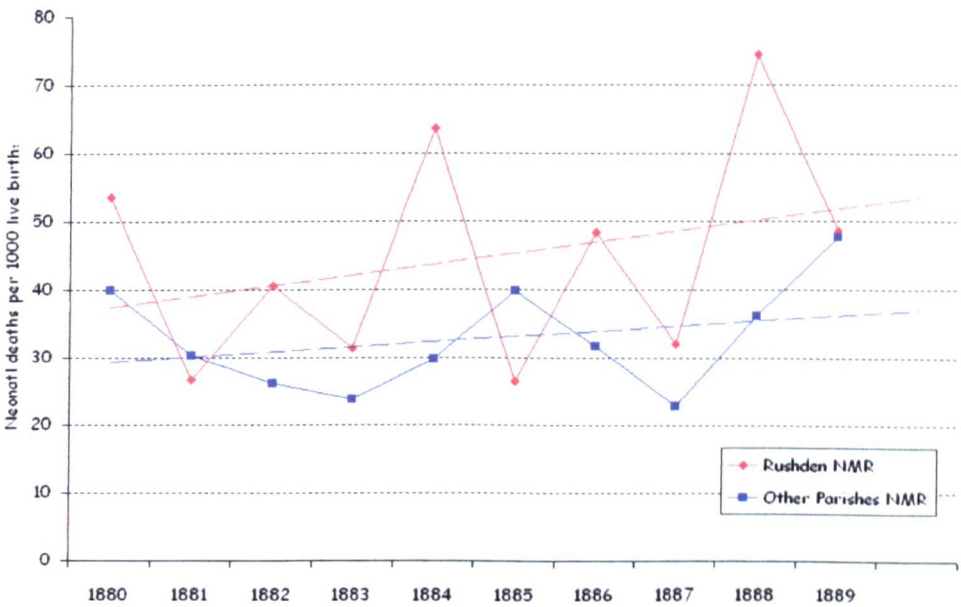
The rise in NMR in 1888 was however independent of P-NMR but influenced the pattern of overall IMR. There were 255 infants born in the 1888 cohort of whom 19 died in the first month after birth and 23 died later in infancy. Reasons for the death of so many neonates from this cohort are explored in the following chapters. In common with that of all neonates in the sub-district, the situation for Rushden-born neonates appeared to deteriorate over the decade with a rising trend in NMR (Figure 6:10).

Figure 6:9 *Annual cohort infant mortality rate (IMR), neonatal mortality rate (NMR) and post-neonatal mortality rate (P-NMR) in Rushden 1880 – 1889*

Source: CVRs

Comparison of the cohort mortality rate for neonates in Rushden with that for infants born in the other parishes of the sub-district revealed quite different patterns, with the rate in Rushden significantly higher than that for the other parishes in most years, apart from 1881 and 1885 (Figure 6:10).

Figure 6:10 *Comparison of Rushden annual cohort neonatal mortality rate (NMR) with those of the other parishes of the sub-district from 1880 – 1889*



Source: CVRs

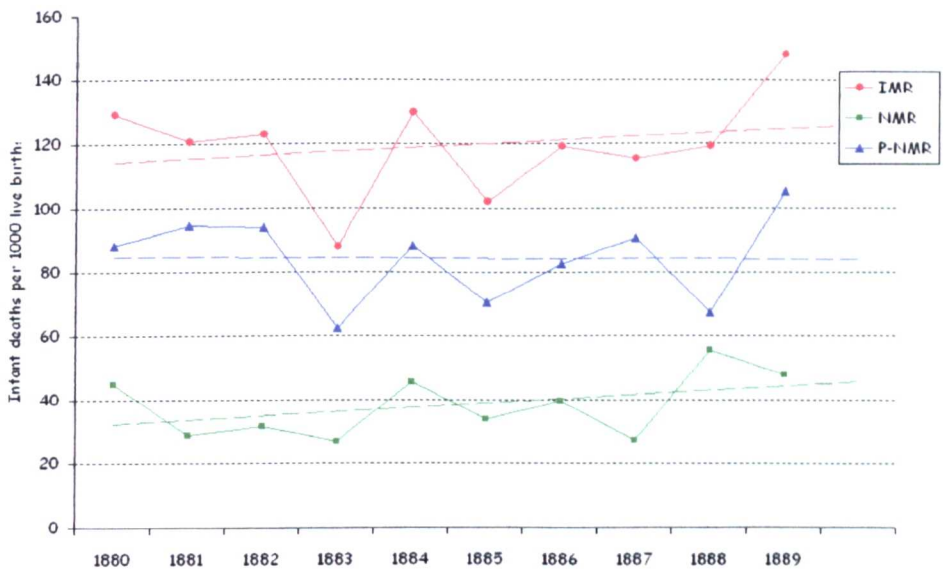
The difference between the decadal Rushden NMR and that for the other parishes was statistically significant ($p=<0.05$), indicating that the situation in Rushden for the youngest members of the population was worse than elsewhere in the sub-district. The biennial peaks in NMR seen in Rushden were not apparent in the neonatal mortality pattern for the other parishes; instead the rate rose more slowly to peak in 1880, 1885 and 1889. The pattern of neonatal mortality in Higham and Irthlingborough showed a pattern similar to

that seen in Figure 6:10 for the other parishes of the sub-district, since it was in these towns that the majority of births and deaths occurred outside of Rushden, with only one significant rise in rate to 57:1000 in 1889. In 1880 the NMR for Higham and Irthlingborough was only 36:1000; the higher rate seen in Figure 6.10 being due to the number of neonatal deaths in the rural parishes where the rate for the 1880 cohort was 47:1000. In the rural parishes the highest rate of neonatal death occurred among the cohorts born in 1880 (47:1000), 1885 (55:1000) and in 1888 (58:1000) but in all years the numbers involved were very small and the results not statistically significant. In 1887 there were no neonatal deaths among the 91 infants and in 1886 only 1 of 80 infants died in the first month. The trend in neonatal mortality rate for the rural parishes differed from that found in the urban parishes and was down over the decade.

6:8 Post-neonatal mortality

For infants who survived the first month the post-neonatal pattern of mortality was similar to that seen for IMR apart from that for the cohorts born in 1880 and 1888; both years when the rate of neonatal mortality was high (Figure 6:11).

Figure 6.11 *Annual cohort infant mortality rate (IMR), neonatal mortality rate (NMR) and post-neonatal mortality rate (P-NMR) in Higham Ferrers 1880 – 1889*



Source: CVRs

The contribution of the post-neonatal deaths to the high rate of IMR in 1889 is clearly seen in Figure 6.11. The trend in P-NMR which was slightly downward differed from that of IMR and NMR which were both upward although the trend for IMR changed direction when 1889 was removed.

In Rushden, unlike elsewhere in the sub-district, the post neonatal rate also rose over the decade, more steeply than NMR even when the data for 1889 was removed from the calculation, indicating a worsening of the conditions for all infants (Figure 6.9). Despite the trend, the P-NMR in the urban parishes was higher than that in Rushden for several cohorts notably 1881, 1882 and 1887. In contrast the rate in 1888 was very low at 31:1000 – a year when there were only 5 deaths from 159 births. The difference between P-NMR in Rushden and that in Higham and Irthlingborough was statistically significant at the 5% level.

Conclusion

The pattern of IMR across the sub-district was one of short term increases in rate with some cohorts, notably those born in 1880, 1884 and 1889, having a higher proportion of infants die than others such as 1883. In the different parishes of the sub-district, the rate of neonatal mortality rose throughout the decade, but that for the older infant varied. The trend in P-NMR rose more steeply in Rushden, whereas in the other parishes, the rate declined over the decade, indicating an improvement in conditions for the older infant which was not seen in Rushden.

A series of changes, mainly resulting from the industrialisation of the shoemaking processes, which occurred during the late 1870s and early 1880s, had the potential to impact on the infant experience, particularly in the urban setting of Rushden, although it is not possible from this data to confirm the link. In Rushden the massive 103% increase in population may have been a factor in the deteriorating conditions for infants as the rate of infant mortality continued to rise over the decade in contrast to the other towns and villages of the sub-district. The environment into which Rushden infants were born was potentially overcrowded and unsanitary, despite the house building programme and pressure from the MoH to improve the sanitary arrangements. According to Szreter (1988) measures taken to eradicate overcrowding were an important factor in the decline of infant mortality, but in Rushden it appears that the increases in housing stock only maintained the *status quo,* since household size remained at 5.1 throughout the decade. Population density rose during the 1880s and continued to rise over the next decade as the town expanded. Whilst population increased in the other parishes of the sub-district, it did so in a much more limited way and arguably with less impact on the infant experience.

In contrast to the situation for the older infant, that for the neonate deteriorated not only in Rushden, but in all parishes, apart from the most rural (although the numbers were very small). This would suggest that the detrimental influences on the infant experience at this age were generalised throughout the sub-district, rather than localised as for the post-neonatal infant. Whereas the experience of the older infant born in the sub-district during the 1880s might have been influenced by exogenous factors such as infectious epidemics, neonates may also have been influenced by endogenous factors relating to maternal influences, which had the potential to impact on the foetus as well as the new born.

As King (1997:23) indicates, *"mortality for communities or groups simply cannot be generalised into stark figures of rates per 1000 without some analysis of the context in which death took place".* In the next chapters therefore, these issues will be explored at the level of the individual infant, identifying which babies died, when and where. Using this information, judgements can then be made as to why post-neonatal mortality rose in Rushden in contrast to the other parishes and why the chances of survival for the infant who survived the first month of life declined throughout the sub-district over the 1880s.

Chapter 7. Infant mortality and the Environment

According to Bell and Millward (1998) infant mortality levels are acknowledged to be sensitive indicators of the quality of the environment. In common with the national pattern of infant mortality, that for Higham Ferrers was one of peaks and troughs during the 1880s. There was a marked urban-rural difference in the rates but not in the pattern, indicating that although the causes of infant death may have been similar, they had a lesser impact in the villages. The expansion of Rushden increased the potential for infectious epidemics due to overcrowding, insufficient clean water and inadequate sanitation. The influence on the infant experience was evident from the rising trend in infant mortality rate over the decade, a feature not apparent in the smaller towns of Higham and Irthlingborough. The neonatal mortality rate however increased steadily throughout the district.

In this chapter the influence of the environment on the infant experience will be examined through an exploration of the key causes of infant death - infectious epidemics, bronchitis and diarrhoea, using information from the combined vaccination registers (CVRs), supported by the MOH reports for the sub-district from the 1880s.

7:1 Exogenous factors influencing infant death

According to Szreter (1988), it was the changes in classic hygiene and sanitation diseases that had a major impact on infant mortality rates. He indicates that during the first two thirds of the 19th century, the incidence of these diseases rose as a consequence of a deterioration in the urban environment due to industrialisation and urbanisation. The environment and therefore infant mortality rates started to improve following the Public Health Acts in the last quarter of the 19th century, particularly that of 1875, which consolidated all the previous legislation. Piped water became more common and removal of waste better organised. Millward & Bell (2001) argue however, that this improvement in mortality rates was part of an existing downward trend that had been masked by the deterioration in the urban environment and that when the environment improved the pattern of infant mortality was able to continue its downward trend. Szreter and Millward & Bell all agree, however, that the sanitary improvements made the environment a healthier place to live and as such must have impinged on infant mortality rates.

As seen earlier, industrialisation came late to Higham Ferrers and it was the 1870s before there was any degree of urbanisation and population growth (Figure 2:9) The consequence on the infant experience of the deterioration of the environment can be seen in Figure 6:1, with high IMRs in excess of 150 infant deaths per 1000 live births. It would appear however that this period was very short lived and within 30 years the IMR had declined and was found to be stable around 100:1000.

The impact of inadequate water, ineffective sanitation and overcrowding on the health of infants has been discussed by many (e.g. Woods et al 1988; Williams & Galley 1995; Bell & Millward 1998), but apart from generic groupings, few indicate the actual cause of infant death, as reliable information is not available from published sources (Williams 1992). In the 1880s, developments in microbiology and the ability to identify causative organisms led to a partial understanding of transmission routes and thus an understanding of how to limit the spread of infection. The cure though remained elusive for most diseases until the 20th century (McKeown 1979).

Published data from the Registrar General's Office for the Wellingborough Registration District giving cause of death for the infant under one year, demonstrates that during the 1880s, apart from a large '*other causes*' category, 49% of infant deaths could be grouped into five main categories (Table 7:1).

Table 7:1 *Summary of the major exogenous causes of infant death in the Wellingborough District 1870 – 1910*

CAUSE	1870s	%	1880s	%	1890s	%	1900s	%
Whooping-cough	77	*3.97*	97	*5.36*	96	*4.64*	93	*6.08*
Diarrhoea and Dysentery	183	*9.44*	108	*5.97*	173	*8.37*	106	*6.93*
Diseases of Nervous System [i]	303	*15.63*	194	*10.72*	220	*10.64*	9	*0.59*
Diseases of Respiratory System	352	*18.16*	414	*22.87*	373	*18.05*	245	*16.02*
Diseases of Digestive System	41	*2.12*	99	*5.47*	123	*5.95*	11	*0.72*
Measles	37	*1.91*	32	*1.77*	45	*2.18*	15	*0.98*
Scarlet Fever	15	*0.77*	9	*0.50*	2	*0.10*	2	*0.13*
Other Causes	793	*40.92*	679	*37.51*	903	*43.69*	979	*64.03*
Deaths from All Causes	1938		1810		2067		1529	

[i] The deaths due to nervous diseases declined markedly in the first decade of the 20th century but this may have been due to a reallocation to the 'other causes' category.

Source: Registrar General's Decennial Reports

Whilst some infectious diseases such as whooping cough were specific, three categories related to symptoms resulting from the impact of disease on an organ system (nervous, respiratory and digestive) and as a result, the actual cause of death was less identifiable. For example, diseases of the respiratory system (23%) were the most dominant cause of infant death in the district, but this would have encompassed a wide variety of conditions, from disorders of the lungs due to prematurity, allergies such as asthma or croup and infections such as bronchitis. Bronchitis was itself also a side effect of other infections such as measles and either could be listed as the actual cause of death.

In the absence of death certificates, the only evidence in Higham Ferrers for the causes of infant death is the Medical Officer of Health (MOH) annual reports. As Drake & Finnegan (1984) indicate, these reports highlighted issues pertinent to the individual area but as they did not follow a standard format, the information provided was not always consistent. However Thomas, the MOH reporting on the sub-district throughout the 1880s, details the annual number of people dying from infectious diseases and on occasions, reports ages and places of those affected. In addition in some years he gives details of other causes of infant death such as prematurity, accidental death or death due to inherited defects. Using this information, together with that on infectious diseases epidemics from the Registrar General's quarterly reports, it was possible to identify

patterns of infection in Higham Ferrers during the 1880s.

7:2 Respiratory diseases

According to Ogle (1892), the national incidence of respiratory diseases, especially bronchitis, continued to increase during the last two decades of the 19th century, with an infant mortality rate of 37:1000 in urban areas during the period 1889– 1891, compared to 21:1000 in the rural districts that he surveyed (cited by Williams & Galley 1995:413). Szreter (1988) indicated that there was an absolute increase of 20% in mortality from respiratory diseases by the end of the 19th century and suggested that of these diseases bronchitis was the single most important killer – responsible for 16% of *all* deaths (not just amongst infants). In general respiratory infections were seen to be infections associated with overcrowded, damp conditions especially those transmitted by droplet infection (Huck 1997). As Szreter (1988:13) indicated "*It is most probable that overcrowded conditions of living, sleeping and working became more prevalent as industrialisation and urbanisation intensified*". Research carried out by Shelter in 21st century Britain among the poor and homeless found that one in 12 children in England, Wales and Scotland in 2004 were at increased risk of developing diseases such as bronchitis, tuberculosis or asthma because of their poor housing conditions (Mayor 2004).

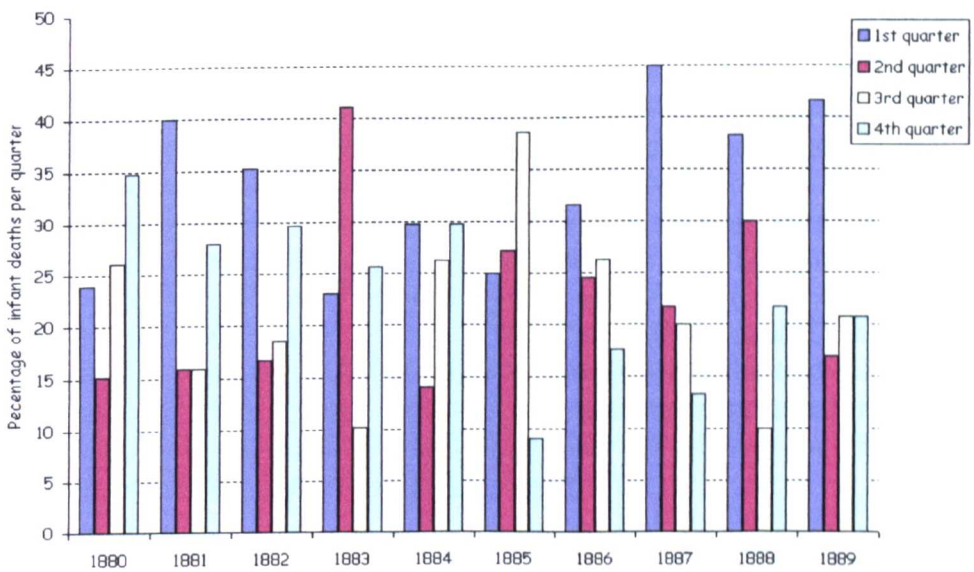
It is clear from the reports of the MOH and from the Registrar General's statistics that respiratory disease was a major cause of infant deaths, both in the sub-district and in the Wellingborough District as a whole (Table 7:1). Bronchitis is mentioned frequently by the MOH during the 1880s, but there is insufficient data to identify who was affected and therefore to determine either the extent of the problem among infants or the urban-rural nature of the disease. In 1882 for example, from the MOH statistics, bronchitis was said to be responsible for 27% (25) of the deaths of all children under 5 years of age and in 1886 for 30% (32) of deaths (Thomas 1883:vi). In both of these years there was a marked absence of other infectious diseases which may account for the increased percentage of deaths from bronchitis. However in all years, the number of deaths from bronchitis was greater than from any other cause with the exception of the very large group of '*other causes*'. Despite the prevalence of bronchitis in the sub-district the MOH did not discuss the disease or comment on prevention, possibly due to the inevitability of the disease given the nature of the environment. Both overcrowding and damp conditions were however raised as key issues in the sub-district by the MOH during the 1880s. An increase in population of 41% contributed to the potential for overcrowding but a concurrent house building programme, which kept pace with the influx of migrants, prevented the mean house occupancy rising over the decade (Table 6:2). The mean household size for the sub-district, which remained at 4.9 persons per household between 1881 and 1891, was similar to that of 4.6 persons quoted by Anderson (1994) for England and Wales for the nineteenth century. The mean rates do not however always provide evidence of overcrowding for individual households unless the number and use of rooms is known. Within shoemakers' households for example one room was often given over to closing, contributing to the potential for overcrowding (Chapter 2). This alternative room-use was not detectable however within the census information.

As well as the domestic environment, the location of the house has also been implicated in the development of respiratory disease. Munro (1994) in his study of the impact of the soil type on infant mortality rates in the 1980s found that in general the infant mortality rate in wet soil areas was higher than that seen in dry areas. Wet soil areas were those where clay caused water-logging of the soil producing damp cold conditions

especially during the winter months. In 1880, the MOH for the Wellingborough Rural Sanitary Authority referred to the impact of flooding which led to an increased rate of mortality from bronchitis (De Haviland 1880:35). In 1886 Thomas also commented on the way in which the clay soils of the sub-district contributed to consumption: '*There has always been a high number of deaths from consumption as the soil is damp clay on which houses are built and the occupation of the majority of people is in shoemaking, which is not, when carried on in crowded workshops, a healthy one*' (Thomas 1886:vi). However, only the villages of the sub-district were found in the clay vale and for these parishes the infant mortality rate remained low with the exception of 1880, 1881 and 1882 (Figures 2:5 & Table 6:4).

Apart from mention in the MOH reports, the main evidence within the sub-district that respiratory disease was a factor in infant death was the seasonality of infant deaths. Bronchitis was particularly common when the weather was cold and damp and therefore in areas where respiratory diseases were prevalent, the number of deaths was higher in the winter months. Within the sub-district between 1880 and 1889 the higher percentages of infant death occurred more commonly in the 1st and 4th quarters than in the 2nd and 3rd quarters (Figure 7:1).[1] The main exceptions to this were 1883 and 1885 – both years when the standard IMR was lower than in other years, demonstrating the potential impact on infant mortality rates of winter infections (Figure 7:1).

Figure 7:1 *Annual percentage of infant deaths per quarter in Higham Ferrers, 1880 – 1889*



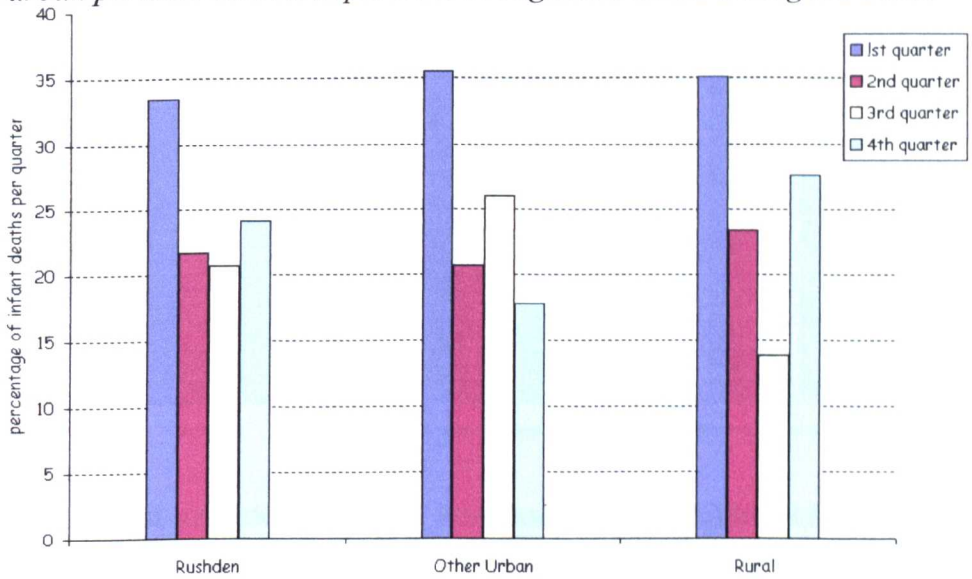
Source: CVRs

The highest percentage of 1st quarter infant deaths occurred in the 1887 cohort (45%), a year when Thomas reported that bronchitis accounted for 32 (31%) of all deaths of children under 5 years of age. In the same year there were also wide-spread epidemics of whooping cough, measles and scarlet fever throughout the sub-district which may have contributed to the high incidence of bronchitis – a side effect of these infections.

[1] Births in each of the years were evenly spread across the seasons with approximately 25% per quarter (1st 26%; 2nd 26%; 3rd 24%; 4th 24%)

Exploration of the seasonality of infant deaths for each of the parishes revealed similar patterns with the highest percentage of deaths occurring in the first quarter even in the smallest parishes (Figure 7:2).

Figure 7:2 *Comparison of the season of infant death in Rushden with that of the other urban parishes and rural parishes in Higham Ferrers during the 1880s* [i]



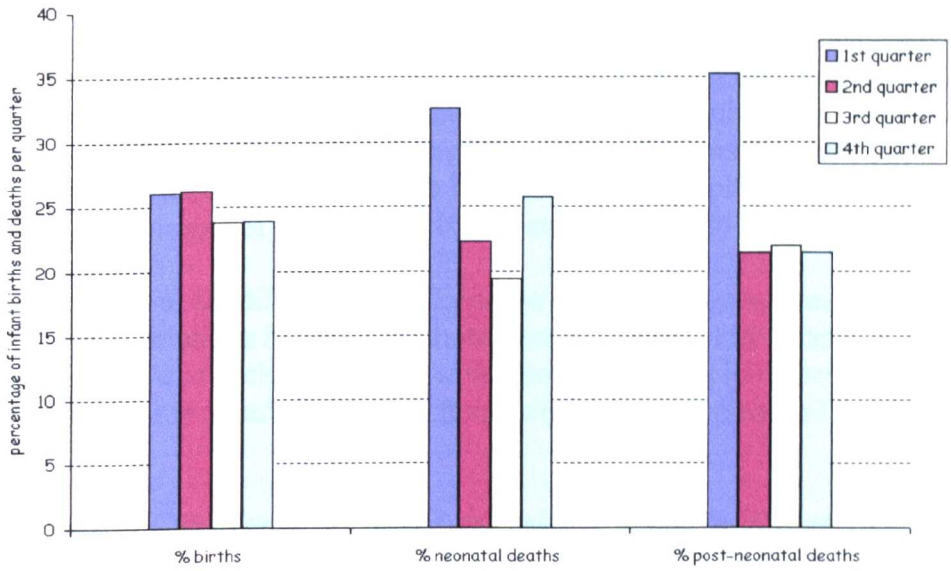
[i] Other Urban – Higham and Irthlingborough; Rural – Farndish, Irchester, Newton Bromswold, Podington and Wymington

Source: CVRs

In these parishes, although 35% of deaths were in the first quarter, deaths in the 4th quarter were also high (28%) indicating the difficulty for infants in these parishes of surviving the winter months. However, as these are percentages, there is the possibility that the pattern in the rural parishes was the result of minimal deaths in the third quarter, rather than high levels of winter death. The difference between the 1st and 3rd quarter month deaths in the rural parishes is however statistically significant (p=<0.01), as is that between the 1st and 3rd quarter months in Rushden (p=<0.01), but not in the other towns Reid (2001) indicated that the most vulnerable infants in the winter months were the new born and that bronchitis was a major factor in their deaths during cold damp periods. In Higham Ferrers 33% of all neonatal deaths occurred in the first quarter compared to less than 20% in the third quarter but this was also the pattern for the infant who survived the first month (35%) (Figure 7:3).

The numbers of neonatal deaths were however very small but the difference between winter (1st and 4th quarter deaths) and spring and summer deaths was statistically significant (p=<0.5), as was that for the post-neonatal infant (p=<0.01). The difference between neonatal deaths in the winter months and the 2nd and 3rd quarter months was also statistically significant in Rushden (p=<0.1), but not in the other smaller towns or villages of the sub-district, indicating that this was potentially an urban phenomenon.

Figure 7:3 *Comparison of the percentage of births and neonatal deaths per quarter in Higham Ferrers, 1880 – 1889*



Source: CVRs

For the post-neonate the reverse was found with the difference between deaths in the winter and summer months in Rushden and the other towns not being statistically significant whereas in the rural areas it was ($p=<0.1$). It would seem therefore that for the neonate the winter months exacted a greater toll than the summer months in Rushden, but for those who survived the first month the summer was equally perilous. In contrast in the villages the winter months were more a problem for the post-neonate than for the neonate. If bronchitis was the cause of infant deaths in the winter months then it would appear that there was an urban-rural effect, but it may be that other factors were also responsible such as infectious epidemics.

7:3 Epidemic infections: Measles, Whooping cough and Scarlet fever

The MOH reports for the sub-district during the 1880s indicate that several infections were found in epidemic form, including whooping cough, measles and scarlet fever. As seen in Table 7:1, whooping cough accounted for 5.4% of all infant deaths in the Wellingborough District during the 1880s, whereas scarlet fever and measles were only responsible for 0.5% and 1.7% respectively. It would seem reasonable to assume that these proportions also applied to the sub-district, given the similarity of the environment with that of the District as a whole.[2] The higher percentage of infant deaths from whooping cough may have resulted from the fact that immunity to the infection is not passed from mother to child and therefore the infant is susceptible to the disease (Duerden et al 1993). Duerden et al also suggest that as infants are also less able to cope with the coughing characteristic of whooping cough and are less able to expectorate, it is likely to prove fatal in the very young. Malnutrition, overcrowding and the presence of other infections also lower infants' resistance to any infection and therefore death from whooping cough was largely seen to be an urban phenomenon (Gelbart 1999). Major outbreaks of whooping cough exhibited a biennial cycle according to Woods & Shelton (1997) with epidemics more likely to occur in the winter and spring. This pattern was found in the sub-district with the MOH reporting outbreaks in 1882, 1884, 1886 and 1888; usually in the 1st or 4th quarters (MOH reports 1880 - 1890) (Table 7:2).

[2] It is not possible at this time to verify this assumption as the cause of death information for the sub-district is not available.

Despite the introduction of an effective vaccine in the 1950s, whooping cough remained a worldwide problem throughout the 20th century with an estimated 40 million people infected annually, of whom 400,000 would have died (Gelbart 1999). As currently 80% of deaths caused by whooping cough are among infants, it remains one of the major infectious diseases of infancy, especially in developing countries (Morello et al 1984). Death from whooping cough usually occurs as the result of respiratory complications, especially pneumonia, or neurological disorders such as convulsions, or cerebral haemorrhage (Duerden 1993), so it may be that whooping cough also contributed to the high percentages of deaths from these causes as seen in Table 7:1.

The potential for differences in the cause of death diagnosis may also be a factor in the regional variations in early childhood deaths identified by Woods & Shelton (1997). For example, closely associated with whooping cough in respect of its timing and target populations is measles – an infection particularly prevalent in Higham Ferrers during the 1880s.

Table 7:2 *Calendar of epidemics and related deaths in Higham Ferrers, 1880 – 1889*

Year	Epidemic
1880 /1881	Large epidemic of measles in Wellingborough11 deaths in Rushden in November Spring months inclement with outbreaks of bronchitis and Diarrhoea
1882	Epidemics of whooping cough, measles and scarlet fever. Scarlet fever - 200 cases and 6 deaths. Affected villages especially Podington 12 deaths from whooping cough – 7 in Rushden Measles also prevalent with 2 deaths in Higham
1883	No epidemics, but sporadic cases of scarlet fever in Irchester and Rushden
1884	Severe epidemic of measles that lasted over 8 months. 8 deaths in Rushden. 50 – 60 cases all under 5 years Whooping cough epidemic with 14 deaths – 7 under 1 year Epidemic of scarlet fever in Irthlingborough with 5 deaths
1885	No epidemics
1886	Measles epidemic in Rushden – 6 deaths in January. Further epidemic in June / July. Spread to surrounding villages Scarlet fever and whooping cough also prevalent with 13 deaths of children under 2 years
1887	No epidemics
1888	Whooping cough epidemic with 8 deaths in Irthlingborough – 5 of whom were under 1 year Concurrent outbreaks of scarlet fever and measles with 3 deaths
1989	Widespread measles epidemic in Rushden with 14 deaths of children under 2 years Whooping cough outbreak with 7 deaths under 1 year

Source: MOH Annual reports 1880 to 1890

According to Woods and Shelton (1997) the Wellingborough registration district was a 'black spot' for measles, responsible for an early-childhood mortality rate of 15-35

deaths per 1000 during the period from 1871 – 1880. The incidence declined in the 1880s, but measles remained a major factor in early childhood mortality rates. Unlike whooping cough, immunity from measles was provided for several months for the infant by those mothers who were themselves resistant, thus allowing time for the infant's immune and respiratory systems to mature. For this reason, measles was generally seen to be a disease of early childhood, rather than infancy. Unprotected infants would however have been at risk, but as the infection was endemic in most populations in 19th century England, it is unlikely that there were many mothers who escaped measles infection in childhood and so were unable to pass on antibodies. Interestingly the neonatal mortality rate was highest in the years when there was a measles epidemic (1880, 1884, 1888 and 1889) and it may be that there was an, as yet unproved, link between measles, neonatal mortality and maternal health (Table 7:2).

As in the case of whooping cough, the major complications of measles were bronchitis and convulsions, but in addition and possibly more importantly, diarrhoea, which affected, and in the 21st century still affects, 1in 6 infants infected with measles. As diarrhoea is a major component in infant and early childhood mortality, this aspect of measles infection still makes it a major killer in developing countries today. According to Woods & Shelton (1997), measles and whooping cough also showed excess mortality among girls, although it is not clear why this should be. In Higham Ferrers deaths of males especially neonates was higher than females during years when there were epidemics, although female rates were also high during these years compared to years when measles was not mentioned by the MOH. It is not possible however to determine the cause of their death.

Woods & Shelton (1997) found in their study of Birmingham from 1880-1901, that when child deaths from whooping cough were high, the death rate from measles was comparatively low. The infant death rate from measles was lower in the sub-district than that for whooping cough, presumably because when whooping cough rates were high fewer infants survived to die of measles. On the other hand when measles deaths were high they were also high for whooping cough. In this situation, it is thought that the infant weakened and malnourished from measles would have been unable to withstand the deleterious effects of a subsequent attack of whooping cough (Hardy 1993:22). Scarlet fever, the third of the most common childhood infectious diseases, was seen to be endemic in the sub-district reaching epidemic proportions on a biennial cycle, contrary to Woods & Shelton's (1997) findings that scarlet fever had a return cycle of 4 years in the late 1880s. Whilst the incidence of deaths during measles and whooping cough epidemics continued unabated in England throughout the 19th century, deaths from scarlet fever declined after the 1880s (Newman 1906; McKeown 1979, Hardy 1993). According to Woods et al (1989:131), scarlet fever appears during the second half of the 19th century to '*have become markedly less virulent irrespective of man's response or of any environmental change*'. The MOHs in Higham Ferrers continued to report on scarlet fever until 1909 when scarlatina, a much milder form of the disease, was mentioned for the first time (RUDC Minute Books 1893 - 1910). The only deaths from scarlet fever mentioned by the MOH between 1892 and 1909 were in January / February 1906 – a year when the decline in IMR was halted briefly.

In Higham Ferrers, although the MOH reported on infectious diseases on a regular basis, he did not necessarily indicate the number of deaths. When he did, he generally grouped together all those under two years of age and only singled out infant deaths for particular mention when the numbers involved were exceptional (MOH reports 1880 – 1890; RUDC Minute Books 1893 - 1910). For each of the cohorts when the IMR was

higher than average (1880, 1886 and 1889) epidemics of whooping cough, measles and /or scarlet fever were prevalent within the sub-district (Tables 7:2 and 7:3). Similarly in the years when IMR was very low (1883, 1885 and 1887) Thomas indicated that there were only sporadic cases of infectious diseases. When this information is combined with evidence from the CVRs, it is seen that on several occasions a clustering of infant deaths matches information from the MOH on outbreaks of infectious diseases and a pattern is formed from which it is possible to make assumptions about the cause of some infant deaths (Table 7:3). Whilst as a research tool this is inexact and cannot be verified, when reviewed in conjunction with an exploration of the environment, it is possible to identify features within the sub-district which partly account for the pattern of infant mortality seen during the 1880s.

In general the epidemics that Thomas describes centred on Rushden and the smaller towns of Higham and Irthlingborough and only in 1882 was there a major outbreak in the villages (Table 7:3) This occurred during a severe epidemic of scarlet fever with 200 children infected and 6 deaths throughout the parishes of the sub-district (Thomas 1883:II). The epidemic was said to be particularly virulent in Podington, where nearly a third of the 21 infants from the 1881 cohort died, and accounted for the rise in cohort IMR to 162: 1000 seen in the rural parishes (Table 6:4).

Of the 3253 children listed in the vaccination registers, who were known to have survived to their first birthday, 184 children were not recorded in the 1891 census, despite the fact that their families remained in the area – a potential early childhood mortality rate of 57 per 1000, in keeping with the rates found by Woods & Shelton (1997). However whilst a large proportion of these children may have died, a few may have been visiting other relatives etc. on census night. Further exploration of this issue is however outside the scope of this particular study, because of the lack of detailed age at death data beyond the first year.

Control of the spread of infection was seen at the time to be the major factor in reducing infant and child death. The Wellingborough Board of Guardians sent out pamphlets in 1880, instructing the public on measures to take in the face of an epidemic of measles, scarlet fever or whooping cough. It suggested that parents should:

- keep their children 'from unnecessary intercourse' with infected families
- prevent the mixing together of children
- be aware of the early symptoms of infection
- keep any child who shows early symptoms of the infection in a separate room, properly warmed and ventilated. (Owen 1880).

The success of these measures is unknown, but it is clear that within the sub-district, the aim to prevent infected children mixing with others who were not infected was unsuccessful. It was a source of annoyance to the MOH, who often found parents wanting, as demonstrated in his comments on an outbreak of whooping cough in Rushden in the first few months of 1882: *"Some parents appear to treat this disease with great carelessness and take no precautions to isolate their children. They let them go about and give it to others as if it did not matter. This disease is usually a serious one, both for its own dangers and for the other effects that frequently follow it. It is highly infective".* (Thomas 1883: II).

Thomas (1883:II) also complains that it was very difficult to isolate cases and prevent the spread of the infection because *'careless parents let their children play with others'* Similarly he reported the in the following year that:

Table 7:3 *Summary of deaths each month 1880 – 1890 according to year of birth in Higham Ferrers, 1880 – 1890*

	1879		1880		1881		1882		1883		1884		1885		1886		1887		1888		1889		1890	
Cohort IMR			**129.21**		**120.77**		**122.73**		**88.04**		**129.84**		**100.23**		**119.00**		**116.96**		**119.05**		**148.08**		**99.80**	
Births			356		414		440		443		439		439		479		513		504		520		491	
January	3	0	2	2	1	4	1[iii]	7	2	1	1	7	1	1	2[iv]	4	0	12	3[vi]	2	1	14	5	6
February	2	2	1	3	2	10	1	5	0	1	2	3	1	4	4	2	1	6	7	2	3	3	1	3
March	4	4	2	1	2	1	1	4	3	2	1	3	3	1	5	1	3	5	3	6	5	6	3	4
April	1	3	1	2	0	1	3	1	4	3	0	1	2	3	2	2	1	1	2	5	5	1	1	1
May	1	3	3	1	5	0	1	0	1	2	1	1	1	0	3	2	5	0	0	0	3	1	2	4
June	3	2	0	0	2	0	3	1	6	0	3	2	3	3	3[v]	2	4	1	2	1	2	1	1	0
July	0	1	4	1	4	0	3	1	1	0	1	1	2	5	4	1	3	1	8	1	6	0	5	0
August	4	0	1	0	0	0	2	0	2	0	4	0	7	0	3	0	4	0	1	3	4	1	4	0
September	3	2	6	0	4	0	3	1	0	1	8	1	3	0	7	0	4	0	0	1	5	1	2	0
October	3	1	5	0	4	0	5	0	5	0	5	0	0	0	0	0	0	0	3	1	3	0	3	0
November	5	2	9	0	8	0	5	0	0	0	4	0	1	1	0	0	4	0	4	0	6	0	4	0
December	3	0	2	0	2	0	6	0	5	0	8	0	1	0	0	0	4	0	5	0	6	0	1	0
Deaths	32	20	36	10	34	16	34	20	29	10	38	19	25	18	33	14	33	26	38	22	49	28	31	18
Standard IMR		**157.30**		**106.28**		**113.64**		**110.36**		**109.34**		**100.00**		**129.71**		**91.80**		**126.98**		**136.54**		**136.46**		
	1879	**1880**		**1881**		**1882**		**1883**		**1884**		**1885**		**1886**		**1887**		**1888**		**1889**		**1890**		**1891**

i) The columns with a year at the top indicate the years in which infants were born and the month they subsequently died. which may have been in the same year of the following year. The shaded columns with the year date at the bottom indicate which year infants died e.g. of the four infants who were born in 1880 and died in January - 2 died in January 1880 and two died in January 1881.

ii) Months when the MOH reports an epidemic are highlighted as follows: Scarlet Fever - red; Measles - blue; Whooping cough – green.

iii) In January / February 1882 there was a widespread epidemic of whooping cough in Rushden as well as that of scarlet fever in Podington.

iv) There was also an epidemic of whooping cough with 16 deaths in total. All deaths of children under 2 years

v) There was also an outbreak of measles in June/ July and August 1886 centred on Rushden and an outbreak of scarlet fever also in Rushden

vi) Also an epidemic of scarlet fever in Irchester in January with 2 deaths

'I feel it is necessary to point out that we do not get as much assistance from the general public in preventing the spread of infectious disease as we ought. A certain section of the public seem to think that Scarlet fever, Measles and Whooping Cough are diseases that children must have and the sooner the better. They therefore take no trouble to prevent their children from catching these complaints. Reasoning of this kind is nonsense. These diseases when they are not fatal generally leave children weaker than they were before. People who wish to have strong and healthy children should take precautions to prevent them catching these infectious diseases.'

(Thomas 1884:III)

This theme continued throughout the rest of the 19th century as he and his successors constantly harangued parents for their lack of understanding and in the MOH's opinion lack of care for their children.

In addition to the health promotion given to parents, the MOHs also initiated a wide range of public health measures to limit the spread of these infections. Following Koch and Pasteur's work on identifying causative organisms for infections, the science of disinfectants, their development and use, was a major achievement of the 1880s (Weindling 1992). Within the sub-district the MOH made much use of the new science of bacteriology. Well-water was tested on a regular basis and vast quantities of disinfectant was supplied to schools and private houses where there were outbreaks of infection, destroying (and replacing at the Council's expense) beds and bedding and eventually disinfecting material using a disinfecting oven.

The building of an isolation hospital was also a source of much discussion throughout the 1880s and was introduced for a smallpox victim but closed shortly afterwards. Thomas was against isolation hospitals and claimed in 1889 that a 4 or 6 room house would be preferable with a *'trustworthy couple with no children to receive and nurse patients with infections'* (Thomas 1889:VI). He added that there was no point in building a hospital during an epidemic as' *hospitals built in a panic are generally costly buildings which are seldom if ever of much use afterwards'* (Thomas 1889:VI). Each person who became infected was visited by the Sanitary Inspector or the Medical Officer of Health and a report made of each case.

In November and December 1885 the closure of schools was mentioned for the first time during a widespread epidemic of scarlet fever in Rushden. This was however a controversial issue, because when the school closed the children continued to mix freely; possibly more so than if they had been at school. To prevent this Thomas preferred that only children from infected families were kept away from school. This was not a view that was accepted by all however as Thomas indicates:

"Every assistance was rendered your inspector and myself by the masters of the various schools who refused to admit children from families in which it was known there were cases of scarlet fever. I am of the opinion that the precautions taken were more efficacious in preventing the spread of the fever than to rashly close the schools and to allow the children to mix indiscriminately in the street. There is of course much to be said on both sides of the question. It must be admitted that there is a certain vigour about closing a school but I have always thought the measure except in large towns where the children come from different and widely separated parts was one of show more than of real practical good in villages of the size of these in your District. I have made these remarks as I am aware that my conduct in not causing schools in Bozeat and Rushden to be closed has not met with universal support"

Thomas (1886:III)

Whilst these preventive measures did not apply to infants under 1 year, the infants were of course indirectly affected via their older siblings and if the household could be kept free of infectious disease then the infant would benefit. For even those who survived the original infection may have been sufficiently weakened to make them susceptible to other, often fatal, diseases of early childhood (Woods & Shelton 1997).

It would appear therefore that the excess infant mortality during the 1880s in Higham Ferrers can be attributed to large scale epidemics of measles, whooping cough and scarlet fever that affected infants directly. The epidemics occurred at frequent intervals and in the years when the standard IMR was particularly low – 1881, 1885 and especially 1887, the MOH comments on the fact that the sub-district was free from epidemics. It was also seen that by the end of the 19th century the extreme fluctuations in rate had petered out and that IMR varied little (Figure 4:5). If as the evidence suggests, the peaks in IMR resulted from infectious epidemics, then the lack of 'peaks' would indicate that either the epidemics had ceased or the causative organisms were less virulent or, as McKeown (1979) hypothesised, the host was more resistant to infection as a result of improved nutrition. Reports from the MOH in the Rushden Minute books indicate that epidemics continued throughout the rest of the 19th century in Rushden but deaths from them were only mentioned in 1892 when there were 12 deaths from whooping cough and 1906 when 6 deaths resulted from scarlet fever. The prevention methods introduced in the 1880s were continued, but appeared to have little effect in limiting the disease pool. There were no cures available until antitoxin for diphtheria was introduced in Rushden in 1910, at the time of a particularly virulent epidemic. According to the MOH however there were no deaths (RUDC 1910).

7:4 Smallpox

Smallpox differed from the other infections in that there was only one outbreak identified in Higham Ferrers during the 1880s, with 4 infants and an adult in Rushden in 1882 infected, but no deaths were recorded (Thomas 1883). The low level of smallpox infection certainly in the sub-district, was said by the MOH to result from vaccination. He constantly harangued parents to do their duty and to have their children vaccinated, because according to him vaccination limited the disease pool and thereby reduced the chances of an outbreak of the infection (Thomas 1884). Although smallpox was not of itself a factor in infant death in the sub-district during the 1880s it has been included in this chapter because of the possibility that vaccination was detrimental to the infant.

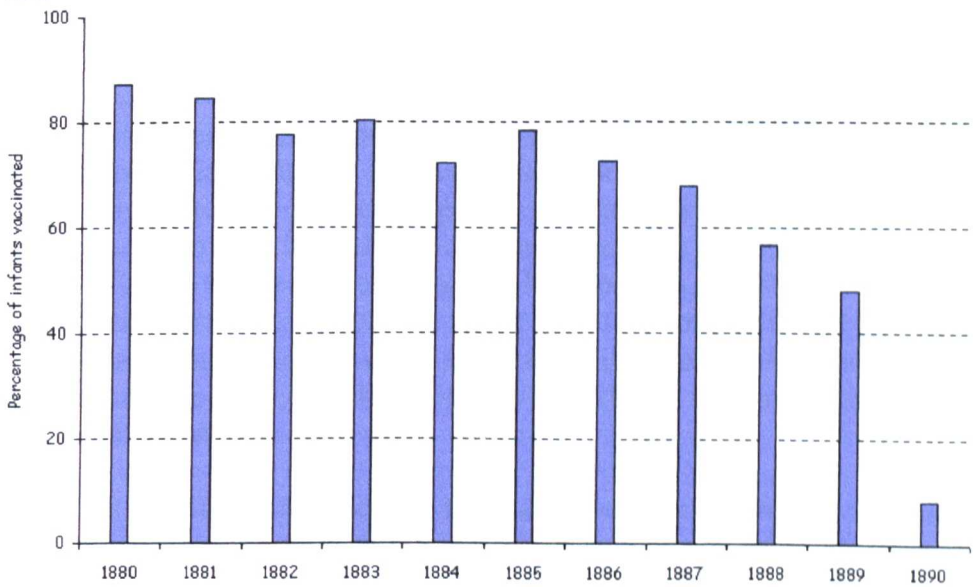
During the 1880s, 3250 of the 4547 infants born in Higham Ferrers were vaccinated (300 died before the compulsory age for vaccination to take place). The majority of vaccinations took place either in Rushden and Irchester throughout April (34%) and October (37%) or in Irthlingborough and Higham in March (11%) and September (12%). The infants from the small rural parishes were mainly vaccinated in Irchester. The Public Vaccinator in Higham Ferrers from 1879 to 1913 was Dr John Crew, who carried out 91% of all vaccinations in the 1880s in either multiple sessions of 10 – 20 infants or smaller sessions with only 1 or 2. Vaccinations were also given by Drs Heygate, Freeman, Owen or Thomas in the 1880s – all Medical Officers in Rushden and by 42 other doctors; 23 of whom were known to have lived outside Higham Ferrers and may have carried out vaccination privately. The regulations indicated that infants should be vaccinated when 3 months old, but possibly because vaccination sessions were held infrequently the mean age at vaccination in the sub-district from 1880 – 1890 was 150

days.[3]

There were however 564 infants who were vaccinated before 3 months – 191 by 2 months of age and 4 before 30 days old. There appeared to be little reason for such early vaccination, but it may be that as sessions were only held twice a year, there was a concerted effort to vaccinate as many children as possible at each session, regardless of their age. The number of infants vaccinated decreased over the 1880s, such that by 1890 only 8% of infants and by 1894 less than 1% of infants were vaccinated - a pattern that continued until the introduction of new regulations in 1898 (Figure 7:4).[4]

Many reasons have been put forward in explanation of the decline in uptake of smallpox vaccination, including the fear of the health risks involved (Durbach 2000). The objectors to vaccination feared the use of animal matter, which was thought to be very hazardous and contrary to the rules of nature, especially as the lymph came from infected pustules on the animal (Henderson & Moss 1999). Mary C. Hume –Rothery, who in 1878, wrote a pamphlet entitled "*150 Reasons for Disobeying the Vaccination Law by a person prosecuted under it*", clearly identified the use of infected matter as a concern, stating that "*vaccination is a poisoning of the blood through wounds in the skin precisely analogous to the stings of poisonous plants, insects and scorpions and to the bite of serpents and mad dogs …*" (Hume-Rothery 1878:II). Others objected on religious or ethical grounds suggesting that epidemics were '*Acts of God*' and as such should not be tampered with (Baxby 1999).

Figure 7:4 *Percentage of infants vaccinated each year in Higham Ferrers from 1880 to 1890*



Source: CVRs

Parental concerns about the safety of vaccination for their children revolved around the method, the lymph and the place where vaccination took place. In the first place the method used during the 1880s was neither painless nor a minor intervention since vaccinators used a lancet and made a series of cuts in a grid pattern in at least four places on the infants' upper arm. Lymph containing the vaccinia virus was smeared into

[3] There were 145 children / adults vaccinated after 1 year and these have not been included in this calculation. 12 individuals were vaccinated over 10 years of age and 4 were in their 20s.
[4] See Chapter 3 for a more detailed discussion of the changes in vaccination regulations

the cuts (Durbach 2000). The site then became infected and a vesicle or pustule formed containing lymph. This reached a maximum size between the 8th and 10th day post vaccination and was often accompanied by a low grade fever. Subsequently the vaccination site healed and a scar was formed (Henderson & Moss 1999). The availability of fresh lymph (taken from a calf) was rare during the 1880s and the majority of infants received lymph from another infant, using the arm-to-arm method. This method had the potential to transmit not only the vaccinia virus but also other infections, notably syphilis, scrofula and tuberculosis (Henderson & Moss 1999). There seemed to be little or no choice regarding the lymph donor and although children who showed obvious signs of infection were rejected, many parents possibly rightly feared the transmission of other infections (Durbach 2000). Occasionally the lymph used by private vaccinators was dried and stored in glass tubes, but public vaccinators were urged to vaccinate from arm to arm 'to keep the supply of lymph flowing'. Those who were able to afford private health care would not have used the public vaccinator, but for the majority there was little choice. After 1871, in addition to a fine for not having children vaccinated, a further fine of 20s was imposed on parents who refused to allow lymph to be taken from their child for use in public vaccination (Baxby 1999; Durbach 2000).

It is not known where the vaccinations took place in the sub-district during the 1880s but nationally the vaccination stations were often the workhouse infirmary, church halls, public houses or similar buildings identified by the Board of Guardians, because the Public Vaccinator was not allowed to use his own establishment (Durbach 2000). Many of the vaccination stations were unsanitary and potentially unwholesome places and of course the visit had to be repeated in order for the vaccination site to be checked and lymph to be extracted, to be given to the next child.

All vaccinations carry an inherent risk of complications not least the risk of anaphylactoid reactions following the injection of foreign protein. Anaphylactic reactions occur immediately after vaccination and may result in death if the means to reverse the reaction with adrenaline (a process unknown in the 1880s) was not available. There appears to have been three occasions when this may have been the cause of death in the 1880s in Higham Ferrers. Thomas Scarborough, Geoffrey Wilby and Gordon Wise all died on the day they were vaccinated. It is not possible to tell from the data whether vaccination was the cause of these deaths, but as infants were required to be healthy and have had no contact with any infection at the time of the vaccination, it seems highly probable.

As well as anaphylactoid reactions there are a number of other complications associated with the injection of the vaccinia virus which include convulsions, post-vaccinia encephalitis and eczema (Gurvich 1992). Lane et al (1970) in a survey in the USA in 1968 found that post vaccine complications, particularly neurological ones, were high if vaccination took place during the first year of life. Gurvich (1992) also found in a study of post-vaccinia complications in Russia during the 1970s, that children aged 1-2 years old were twice as likely to experience convulsions following vaccinations than older children. Post vaccination encephalopathy also occurred in children who were less than 2 years old when vaccinated and led to death after 6 – 10 days (Henderson & Moss 1999). Infants suffered a high fever and convulsions and the few who survived were unlikely to make a full recovery. By the end of the 19th century the recommended age for vaccination had risen to 6 months as a result of the 1898 Vaccination Act and in 1970 rose again to 1 year because of the potential for complications (Greenwood 1901; Gurvich 1992). Deaths from these causes may well have contributed to the large percentage of

deaths occurring in the district due to neurological disease and, in addition to those who died on the day of vaccination in the sub-district there were a further 6 infants who died within 2 weeks of the vaccination. Hugh Wright died only 3 days later but the others were vaccinated between 10 – 14 days before dying.

There were a further 103 infants in Higham Ferrers between 1880 and 1889 who died after vaccination although it is unlikely for the majority that their subsequent deaths were connected. Morbidity resulting from vaccination may have been a factor in their deaths from other causes, leaving them weakened and less able to resist infection. However, when only those infants who are in view from 42 days (the latest age for registration) to first birthday are considered, then the opposite would appear to be true. The mortality rate for infants who were *not* vaccinated during the 1880s was extremely high at 519:1000 compared to 34:1000 for those who were ($p=<0.001$). This would seem to indicate that the screening-out process was efficient, neonatal death had removed the weaker infants, or not having the child vaccinated was a characteristic of families at high risk of infant death. This is an area that requires further research especially during periods where vaccination rates were low such as the 1890s in Higham Ferrers or in areas such as nearby Oundle where the parental resistance to infant vaccination was minimal.

7:5 Diarrhoea

There seems little doubt that diarrhoea was a major influential factor in infant mortality rates in the second half of the 19th and early 20th century, however the scale of problem varied across the country (Graham 1908; Williams & Galley 1995; Reid 2002). Within the Wellingborough District, diarrhoea was said to account for 5.97% of infant deaths – far less than that for deaths from respiratory diseases, even when combined (as it was in the Wellingborough data) with deaths from dysentery (Table 8:1).Diseases of the digestive system were also said to account for the deaths of a further 5.5% of infants, but the link between these and diarrhoea is unclear (Woods & Shelton 1997).

The aetiology of diarrhoea in infants was poorly understood in the 19th century, but the main influencing factors were identified as unsanitary conditions (especially urban), weather conditions and/or poor feeding habits (Newman 1906). Thomas (1886) provided examples of the confusion that existed. Diarrhoea was also seen to be a complication of teething or other infectious diseases such as measles. Whatever the cause of diarrhoea, as Hardy (1993) and Risse (1997) indicate, the representation of the cause of death on the death certificate can result from a complex interaction of many interrelated issues. Diarrhoea is generally a symptom, not a disease in its own right and some may have chosen the symptom as the cause of death - as it would have been - whilst others strove to find the cause of the symptom. When efforts to improve public health had been great, death as the result of diarrhoea, the 'filth' disease, may not be reported as such, especially by sanitarians or those with a vested interest in public health measures. All were agreed however on the particular vulnerability of infants to diarrhoea and Newman (1906) indicated that infants accounted for 75% of all deaths from epidemic diarrhoea.

Diarrhoea has been cited by many as an urban disease and the factor mainly responsible for the urban excess of infant mortality, which was seen especially at the end of the 19th century (e.g. Newman 1906; Woods et al 1988; Woods 2003). Williams and Galley (1995) identify diarrhoea as the single most important factor in infant mortality, occurring 8 times more commonly in urban areas. Huck (1997) concurs, indicating that diarrhoea demonstrated a very positive urban affect and was closely related to

population density. On the other hand Woods and Shelton (1997) indicate that, where infant death from diarrhoea and dysentery was concerned, although there was a correlation between population density and infant mortality, the highest rates were seen in emerging towns. During initial periods of urban growth, increasing population density led to deterioration in the environment, as sanitary arrangements were overwhelmed. The resulting conditions provided a breeding ground for diarrhoea-related micro-organisms such as E.Coli, leading to the contamination of food and water supplies.

Epidemic diarrhoea, especially among infants, experienced a seasonal variation with the highest rates of death occurring in the summer / autumn months according to Williams & Galley (1995).[5] They argue that the urban–rural difference in infant mortality was present throughout the year, but was most apparent during the summer months when urban infants succumbed to diarrhoea-related diseases. In addition to the summer temperature Newman (1906) also indicated that rainfall was important and that the highest rates of diarrhoea were to be found when the summers are not only hot but dry. Quoting Ballard (1887) Newman (1906) indicated that for the conditions to be favourable for outbreaks of epidemic diarrhoea, soil temperatures at a depth of 4 feet needed to be at least 56°F. Atmospheric temperature was not relevant, according to Ballard, other than in mediating the rise of soil temperatures. Soil and atmospheric temperatures alone, are not however a sufficient explanation for the urban nature of diarrhoea, since these affected rural and urban communities alike. By 1911 diarrhoeal diseases were dropped from the cause of death category, because the fluctuations in rate because of the weather confused interpretation of the real trends in infant mortality (Armstrong 1986).

For infective diarrhoea to occur, a complex chain of events needs to take place which includes a source of potentially disease creating micro-organisms, a reservoir where the micro-organism can mature and multiply, a viable transmission route and a susceptible host. Prevention or eradication at any stage will stop the infection developing (Roberts 2001). An unsanitary environment such as those found in emerging towns, provided an ideal medium for the growth of bacteria especially in hot weather. Therefore the quality of sanitation and water supply may have acted as differential factors at times when the weather was hot and dry. Newman (1906), who viewed diarrhoea as preventable, suggested that towns which adopted water carriage systems of sewerage removal and instituted scavenging arrangements for the removal of waste, especially horse manure, had less epidemic diarrhoea. He also indicated that the soil around houses was important and where 'loose' became polluted and a reservoir for bacteria. Within the sub-district across the 1880s, the evidence for epidemic diarrhoea as a factor in infant death is minimal. In most years Thomas reported fewer deaths from diarrhoea than from the other infectious diseases.[6] Similarly when the season of infant death was charted the evidence for epidemic summer diarrhoea in the area was limited. Only in 1885 and 1886 were the summer or 3rd quarter percentage of infant deaths over 30%, but even then in 1885 the percentage was still lower than that seen in the first quarter which accounted for 41% of all the infant deaths (Figure 7:1). Of the 14 deaths that occurred during the 3rd quarter in 1885, three were in rural areas and 8 were neonates (Figure

[5] The terms 'summer' and 'autumn' appear to be used synonymously – both referring to the months of July, August and September. In this study the term 'summer' has been used to denote these months.
[6] 1882 – 11 deaths; 1883 – 2 deaths; 1884 – 11 deaths; 1885 – 0 deaths; 1886 – 8 deaths; 1887- 7 deaths; 1888 – 1 death; 1889 – 9 deaths. Not all of these deaths were of infants as the MOH gave overall figures but he does indicate on occasions if the victims were very young or elderly.

7:1). In 1886, on the other hand, there were 20 deaths during the 3rd quarter; all in urban areas but as there was a widespread epidemic of measles, during these months this may have been a contributing factor in a number of the infant deaths. In Rushden, where the potential for deterioration of the environment due to increasing population density was greater than elsewhere in the sub-district, the evidence suggests that summer diarrhoea was not as great a problem as the 1st and 4th quarter diseases.

Unlike the constant haranguing of parents by Thomas to limit the spread of zygomatic infections or to have their children vaccinated against smallpox, Thomas has little to say about infant diarrhoea and appeared to accept it as inevitable. In part this may be due to his belief that it was caused by the weather conditions, rather than by improper feeding as his colleagues believed (Thomas 1887). He reported in 1886 "*Improper feeding is usually assigned as the cause of death from diarrhoea in infancy, but I am of the opinion that the time of the year accounts for a great deal, or why should more deaths take place in the autumn than in any other season of the year?*" (Thomas 1887).

For the infant the most likely route of transmission for epidemic diarrhoea was milk or food supplies or feeding utensils, especially those used for milk (Atkins 1992, Fildes 1998). For these to become infected a vector is required for the faecal-oral transmission of diarrhoea-producing micro-organisms. The most likely candidate is the fly (Huck 1997). Flies are more prevalent in the summer months as hot weather facilitates the breeding process and eggs hatch much more quickly. In his study of Preston, Morgan (2003) also argues the case for flies, indicating that a potential source was horse manure - an excellent breeding ground for flies. Horses became increasingly common in the last quarter of the 19th century according to Morgan and the faecal waste created an environmental hazard in the towns. During hot dry summers, flies would have been numerous, contaminating foodstuffs not only within the domestic environment but also that in transit such as meat and milk supplies. It would also have been very difficult to maintain a high standard of hygiene; the more so as the method of disease transmission was poorly understood.

For the fully breastfed infant, factors such as contaminated food supplies would not have been a problem, unless infected mothers or family members with poor standards of hygiene infected their infants through the oral-faecal transmission of micro-organisms. The risk of infection for the artificially fed infant was however great and therefore, according to Fildes (1998), breast-feeding was the single most important factor in limiting infant mortality.

Huck (1997) suggests that the change in the pattern of disease in infants, from winter deaths due to respiratory diseases at the beginning of the 19th century to summer deaths resulting from epidemic diarrhoea at the end, was brought about by a change in feeding practices. He hypothesises that with industrialisation, a greater proportion of mothers were no longer able to feed infants themselves and changed to artificial feeding which could be carried out by carers. Williams & Galley (1995:414), citing the work of Ogle, also blame infant feeding patterns for the urban excess in infant mortality. They indicate that the urban excess increased with the infants' age and that the mortality of the 6 month old who lived in urban settings at the end of the 19th century was 273% higher than that for the rural infant. In her study of breastfeeding habits in London, Fildes (1998) found that 90% of infants were breast fed initially, but that the variable factor was the length of time. At 3 months, 80% were breast fed, but by 6 months this had decreased to 70%. In other areas the length of time during which the infant was breast fed was considerably shorter – a factor dependent on the mother's working and

therefore childcare arrangements. Fildes also suggested that the pattern of breast feeding was not always a matter of choice and that mothers who worked late in their pregnancies or who were themselves malnourished may have been less able to produce sufficient milk for the infant and unless alternative forms of nutrition were implemented, the infant died. According to Garrett (1998) an increased household income provided by employed mothers may have also benefited the infant by enabling the mother herself to be better nourished. As work outside the home was largely an urban phenomenon this may have been an influencing factor in the urban / rural variable in infant deaths.

In Higham Ferrers it is not known what infant feeding practices were carried out, however diarrhoea was not the problem that it might have been considering the environment, especially the lack of effective measures for waste disposal and the lack of a clean water supply. The majority of women in the sub-district worked in the shoe industry both in the towns and in the villages and as outwork was a major part of the trade it would seem likely that, as in later times, mothers worked in their own homes and could therefore both breast feed and care for their infants whilst supplementing the family income.

Conclusion

It would appear that during the 1880s in Higham Ferrers epidemic infections were seen to be a major factor in infant death, with reports of epidemics and high rates of infant mortality coinciding. Whilst the case can be made that infants suffered high levels of bronchitis, the same cannot be argued for diarrhoea. Although the environmental conditions were, as Thomas described, similar to towns with a high persistence of diarrhoea, this does not appear to have been the case within the sub-district. The environmental situation improved over the decade as new houses were built and Thomas eventually introduced his model bye-laws. These measures may well have impacted on the infant mortality rates after the period studied, but during the years 1880 – 1889 the rate of infant mortality continued to rise in Rushden in contrast to the other parishes of the sub-district where the overall trend was downwards.

In general the environmental influences within the sub-district were seen to impact on post-neonatal mortality, although there were some similarities seen in the neonatal pattern of mortality indicating an exogenous component. However unlike post-neonatal mortality rate, that for the neonate rose throughout the sub-district, not only in Rushden, indicating that factors other than the environment may have impacted on the youngest infants. In the next chapter the endogenous influences on infant death, especially the maternal role will be explored.

Chapter 8. Maternal Influences on Infant Mortality

So far in this study, infant mortality has been seen to result from the complex interaction of many factors. Urban-living, overcrowding, inadequate sanitation, contaminated water and milk supplies and the weather have all been shown to affect the infants' chance of survival. Millward & Bell (2001) suggest however that the impact of the environment on the infant experience may have been mediated through the mother. For example, Das Gupta (1990) found in her study of current child mortality in India, that although there was a link between maternal education and child mortality, it was not education *per se* that enhanced the child's chance of survival, but that mothers who were educated were more able to overcome the factors that contributed to the death of their children. Millward & Bell (2001) also indicate that not only was the health of an infant dependent on the mother's ability and skill to provide quality care, but also on the inheritance she passed to her child, particularly antibodies (Millward & Bell 2001). A mother's health and welfare before, during and after pregnancy may have been a crucial factor in her infant's ability to survive, regardless of the hostility of the environment in which they lived (Williams 1992). If this is so, then the search for influences bearing upon infant mortality is even more complex than first supposed, as 19th century maternal characteristics and abilities such as these are not open to scrutiny by the demographic historian.

There are however a number of factors, which have been implicated in infant death, especially that of the neonate, for which data are available for the sub-district. These include the age of the mother at the time of birth of the infant, maternal occupation, spacing of pregnancies and parity (Newman 1906; Hart 1998; Reid 2001). These factors, as well as others such as gender, multiplicity of birth and inherited defects may be classed as 'endogenous' as they result from non-environmental influences such as '*genetic make-up or circumstances arising before or during birth*', (Reid 2001:213).

In Chapter 6 (Figure 6.10) it was seen that in all parishes studied there was a rising trend in the neonatal mortality rate in Higham Ferrers over the 1880s, with the rate in 1888 particularly high for the area at 56:1000 live births (Figure 6.8). The influence of maternal and other endogenous factors in creating the high rates of neonatal mortality will be explored in this chapter, using a combination of CEBs and CVRs for Higham Ferrers during the 1880s.[1] The urban–rural differences in infant mortality, previously demonstrated for the sub-district will also be explored in relation to these influences.

8:1 Data source

In Higham Ferrers information about mothers *per se* was limited. Dr Thomas, the Medical Officer of Health (MOH), rarely mentioned mothers in his annual reports other than to complain of their inability to care for their children '*properly*', usually with reference to infectious diseases. Within the combined vaccination registers, except for entries relating to illegitimate children, mothers were only mentioned as recipients of the notification of the need for the infant to be vaccinated. In this study the link between infants and mothers was made using the information gathered to identify family groups.[2] Using this combination of sources it was possible to find information relating to the mothers of 3562 legitimate singleton infants within 1513 families. The infants of mothers whose details were unknown because they were not present in the sub-district at the time of either the

[1] The combined vaccination registers (CVRs) included data from both the vaccination birth registers and the infant death registers

[2] See Chapter 3:5 for information on compiling the database

1881 or the 1891 census could not be included. Many of these mothers were widows or unmarried and as there is clear evidence that the infant experience was adversely affected by being a member of a one-parent family, it is recognised that this may impact on the results. These infants together with twins (a group according to Reid (2001) also known to have a poor chance of surviving infancy), their siblings and their mothers will be discussed separately.

8:2 Maternal Age

The age of the mother is said to be an important indicator of infant health and welfare, with infant mortality, especially that of post-neonatal infants, increasing steadily with maternal age (Heady et al 1955; Loudon 1992). The impact on neonatal mortality of maternal age, is however, said to be less clear, but '*extremes of both age and youth in the mother seem to be unfavourable*' (Heady et al 1955:396). Smith et al (2003) also reports that a maternal age of less than 20 years at the time of the birth of a second infant was strongly associated with preterm birth and neonatal death.

In Higham Ferrers during the 1880s, the average age of mothers at the time of the birth of an infant was 28.6 years but this masked a wide variation. The majority of the infants (54.3%) were born to mothers aged 20 – 29 years (Table 8:1). The mothers of approximately a third of infants (35.7%) were aged 30 – 39, 4.6% had mothers aged 15 – 19 and for 5.4 % of infants their mothers were 40 years or over.[3]

The majority of mothers in the 15 – 19 age group were in their late teens, but 4 legitimate infants were also born to mothers who were aged 15 – 16 years of age.[4] The youngest of these was Rebecca Neal who was calculated from the CEBs to be 15 years of age when her son was born legitimately in April 1889. She had no further children before the census in April 1891. Elizabeth Groom aged 24 in the 1891 CEB had 3 legitimate children during her teens – all of whom survived. At the other age extreme, there were 16 mothers who gave birth in their late 40s, the oldest being Elizabeth Watkin, the wife of a shoemaker from Irchester, who had her sixth child when she was 47 years old in 1881.

Heady et al (1955) described a 'tick' shaped pattern of IMR in relation to maternal age with the infants of the youngest mothers having a higher incidence of infant mortality than those of mothers in their early 20s. According to Heady et al, the pattern of IMR was then said to increase with increasing age of the mother. This pattern was clearly discernible in Higham Ferrers with the infant mortality rates for the teenage mothers being higher than that for those in their 20s and 30s (Table 8.1). The IMR then rose with maternal age; infants of mothers in their 20s (the optimum age for pregnancy according to Loudon 1992) having the greatest chance of survival (Table 8.1 & Figure 8:1).

The pattern of post-neonatal mortality followed that of infant mortality overall with the tick-shaped pattern again clearly identifiable (Figure 8:1). The P-NMR for the infants of mothers in their 20s was lower at 67:1000, than that for the infants of teenage mothers (83:1000), whilst that for infants of 40+ year old mothers was relatively high at 105:1000. The difference in P-NMR for infants of mothers in their 20s and 30s and those whose mothers were teenagers was highly statistically significant (p=0.001), as was that for infants of 40+ mothers.

[3] The numbers of infants born to mothers in the age groups at the extremes were very small and therefore to ensure validity of the analysis, age groups were combined to form 4 groups: Teens, 20s, 30s and 40s.

[4] The actual age of the mother at the time of birth cannot be established exactly because of the lack of information relating to the mother's actual date of birth and was therefore calculated from the ages listed in the census.

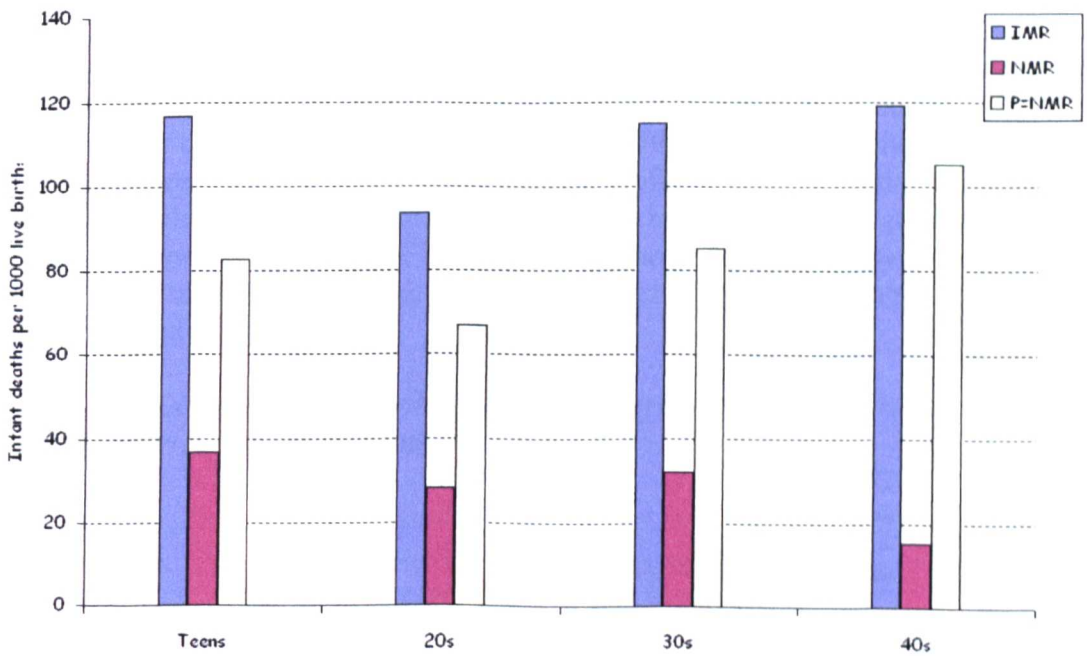
Table 8:1. The percentage of infants born to mothers in each age group, at the time of birth of each infant, in Higham Ferrers, 1880 – 1889 [i]

Maternal Age	Births	% of births	Infant Deaths	Infant Mortality Rate (IMR)	Neonatal deaths	Neonatal Mortality Rate (NMR)
Teens	163	4.6	19	116.6	6	36.8
20s	1935	54.3	181	93.9	55	28.4
30s	1271	35.7	146	114.9	41	32.3
40+	193	5.4	23	119.2	3	15.5
Totals	3562		369	103.6	105	29.5

[i] The age of mother at birth of each infant was calculated at the time of the infant's birth and therefore mothers may appear in more than one category and several times depending on the number of children delivered.

Source: CVRs / CEBs 1881 and 1891

Figure 8:1. *Comparison of the Infant Mortality rate (IMR), Neonatal Mortality Rate (NMR) and Post-neonatal Mortality Rate (P-NMR) by mothers' age in Higham Ferrers during the 1880s*



Source: CVRs / 1891 and 1891 CEBs

According to Heady et al (1955) the previous association of maternal age and IMR is not seen when considering neonatal mortality, although they suggest that the extremes of maternal age are unfavourable for neonates. This was confirmed in the Higham Ferrers pattern of neonatal mortality for the infants of teenage mothers, but not for the infants of the oldest mothers for whom the NMR was low at 16:1000. There were 193 infants born to mothers in this age group, but only 3 died in the first 28 days. All 3 neonatal deaths were the last child born to the mother during the 1880s. This low rate contrasts with the findings of Loudon (1992), who, citing the work of Yerushalmy et al in 1940, indicates a very positive association between neonatal death and maternal age, with the NMR rising to 44: 1000 for infants of mothers over the age of 40 years - five times as high as the rate that he

found for infants of mothers in their 20s. The reason for this association was not cited by Loudon, but as Yerushalmy's study took place between 1932 and 1936, the quality of obstetric care given to all mothers would have improved significantly from the late 19th century, impacting positively on neonatal mortality. The fatal conditions least likely to be responsive to improvements in obstetric practices, are congenital abnormalities which were more prevalent among elderly mothers and may account for the higher NMR found by Yerushalmy for this group.

The situation for teenage mothers was very different. Smith et al (2003) found that infants born to teenage mothers were more likely to die in the first month after birth, than those born to any other maternal age group. Knox (2002) too, indicates that in the 20th century high neonatal and perinatal rates were associated with mothers aged less than 20 years and were potentially attributable to smoking, sexually transmitted infections and poor maternal diet and general state of health. In addition, both Heady et al (1955) and Smith et al (2003), indicate that the highest rates of neonatal mortality occurred among firstborns. As the majority of infants born to teenage mothers were likely to have been the first born, this may be an influential factor in the high mortality rate seen among this group. In contrast in a recent (1990 – 92) study of teenage mothers in Bangladesh, Alam (2000) found that neonatal mortality among teenage mothers was highest for the second born infant rather than the first. In Higham Ferrers the neonatal mortality rate for the 163 infants born to teenage mothers (37:1000) was higher than that for infants from any other group, but the difference in mortality rates between this group and the other infant groups was not found to be statistically significant (Figure 8:1).

The age profile of mothers changed during the decade; the numbers of mothers giving birth in their 20s increased as did the number of mothers in their 30s, albeit to a lesser extent. The number of births to mothers in their teens and 40s remained relatively static over the decade, however (Figure 8:2). This changing profile had the potential to reduce the overall infant mortality rates, as infants born to mothers in their 20s had a greater chance of survival. However, as seen in Figure 6:4, the cohort infant mortality rates rose over the decade; but may have done more so if the number of mothers giving birth in their 20s had not increased as it did.

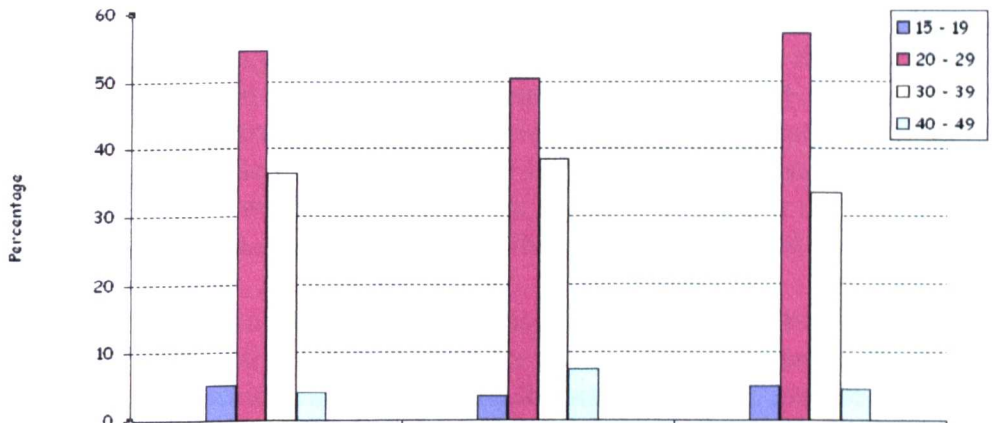
Figure 8:2 *Distributions of births in Higham Ferrers during the period from 1880 – 1890 according to the age of the mother*

Source: CVRs / 1881 and 1891 CEBs

When the maternal age profile of individual parishes was considered it was seen that in all parishes the majority of infants were born to mothers in their 20s, but in Rushden this group accounted for 57% of the births in the town, presumably because this was where both new housing and employment in the shoe industry were concentrated, attracting young couples (Figure 8.3).

As before the mothers' age profile would, potentially, have had a positive effect on the infant mortality rates in the town, but the trend in infant mortality in Rushden over the decade was upward indicating that other influences such as the urban environment counteracted this positive effect (Figure 8:3 and 6:7). In general the mothers of infants born in Higham and Irthlingborough were older than those in either Rushden or the rural parishes, with less teenage mothers and fewer mothers in their 20s, but more mothers in their 30s and 40s (Figure 8.3).

Figure 8:3 *Percentage of infants born to mothers within each maternal age group in each of the areas within Higham Ferrers in the 1880s* [i]



	Rural	Other Urban	Rushden
15 - 19	5.19	3.54	4.97
20 - 29	54.47	50.43	57.00
30 - 39	36.31	38.55	33.41
40 - 49	4.03	7.47	4.61

[i] Other urban: Higham and Irthlingborough. Rural: Irchester, Farndish, Newton, Podington and Wymington
Source: CVRs and 1881 / 1891 CEBs

In the rural parishes the distribution of infants in each maternal age group was similar to that seen for Rushden but with over 5% of the infants born to teenage mothers. The numbers of infants involved were however significantly less.

Whilst the distribution of maternal age groups within the parishes was relatively similar, the neonatal and post-neonatal mortality rates amongst legitimate infants born to mothers in each of the maternal age groups differed substantially. The numbers of legitimate infants born to teenage mothers and to those with mothers aged 40+, were, however, too few for meaningful analysis of neonatal and post-neonatal mortality rates. For infants born to mothers in their 20s and 30s the NMRs in Rushden and rural parishes were both 27:1000 but in the other urban parishes the rate was higher at 35:1000; the difference was not however statistically significant.

The post-neonatal mortality rates for infants born to mothers in their 20s were consistent across all parishes, but the rate for those born in Rushden, whose mothers were in their 30s, was significantly higher ($p=<0.01$) than that for infants, with mothers of a similar age,

in the other parishes of the sub-district. There is little to account for this difference but as seen in Chapter 7 epidemics were more common in Rushden and it may be that these infants had older siblings who attended school and increased the disease pool within the home.

The infants born to urban mothers in the 40+ age group were found to have a lesser chance of survival during the post-neonatal period than those with younger mothers. In Higham and Irthlingborough the post-neonatal rate was high at 116:1000 (compared to the other parishes of the sub-district) and as the percentage of infants born to mothers in this age group was also relatively high, this would have had an adverse effect on overall rates of infant mortality in these towns. In Rushden the rate was lower at 105:1000 but only 1 infant died of the 28 born to mothers aged 40+ in the rural parishes and it may not therefore be a robust calculation (Figure 8:3).

8:3 Maternal Occupation

Susceptibility in early infancy is known to be influenced greatly by the mother's own health and welfare, including her nutritional status both before and during pregnancy (Wrigley 1998; Scott & Duncan 1999; Millward & Bell 2001). The situation is however complex and as Skjaerven et al (1997) and Scott & Duncan indicate, it is not only the effects of maternal nutrition that are important, but also that of the maternal grandmother, since there is '*a strong interaction between mother's birth weight, infant birth weight and infant survival*' (Scott & Duncan 1999:1360). It was not possible from the data available to identify the birth weight of infants born during the 1880s or the nutritional status of mothers in Higham Ferrers other than through an association with maternal employment.

Women's employment leading to an increased household income may contribute to improved maternal nutrition, unless the work involved increases the physical demand on the woman, in which case the benefits for maternal health may be negated (Garrett 1998). As discussed previously, there is little doubt that the success of the shoe industry in Northamptonshire was founded on the employment of women and children, as their wages were less than those of men (Morrison & Bond 2004). However, of the mothers listed in the vaccination registers, only 16% were listed in the 1891 CEB as having an occupation and only 8% were listed as being employed in shoemaking. For so few to be listed in the CEBs would seem an unrealistic reflection of female employment in the area, because although wages were low for women, employment was readily available during the 1880s at a period when shoemaking underwent rapid expansion. Many women with children worked from home as 'outworkers' and as the arrangements at this time were *ad hoc* it may also be that they were not seen as employed for the purpose of the census. According to Higgs (1987) the guidance given to enumerators was unclear with regard to married women's paid work within the home, especially part-time or casual employment such as that of the shoe worker. The census questions related to 'occupation'; a term which may have been seen by some as a social question about status, rather than a specific question about employment. Higgs citing Branca indicates that "*the duties of a housewife may have been seen as the proper occupation of a married woman, whatever her actual experience of work in the factory*" (Higgs 1987:64). It would seem, therefore, that if in some situations those women who worked outside the home were not listed in the census, then it is even more likely that those who combined caring for the household with shoemaking would not be listed in the census as being employed. The combination of roles of women shoemakers was described in 1886 by one reporter in Northampton who wrote ' *the feminine portion of the community vary the operations of putting on quarters and seaming linings with excursions to the kitchen to see how the dinner is cooking or superintending the mysteries*

of the family wash" (*Boot and Shoe Journal* 1886:14). In addition, where women were listed in the census there was no guarantee that they were employed during the pregnancy, or at the time of birth or during the infant's first days and months (Garrett 1998).

Garrett & Reid (1998) argue that whilst the impact of improved nutrition may counter the ill effects of low birth weight, the quality of child care is also important. As the majority of the shoe-working mothers worked within the home, it would seem likely that childcare remained the remit of the mother rather than that of unskilled older siblings or others. Working within the home also ensured that mothers who were able to do so, could breastfeed their infants. The work was not as hazardous for the pregnant woman as that seen in the heavy manufacturing industry or other occupations where the work involved long hours of standing, lifting heavy loads or working in unsanitary conditions (Newman 1906). Therefore if the key to infant death in early pregnancy lay in women's work, the situation for the women in Higham Ferrers was highly favourable. Despite this the neonatal rate remained high.

8:4 Maternal health and mortality

In Higham Ferrers the age of the mother and maternal employment, were potential factors in determining the survival of the infant either directly, or through the mother's ability to provide adequate nutrition and childcare. According to Newman (1906:120): "*A mother suckling her infant requires nourishment and it is lack of nourished mothers among the poor – many of whom are half starved – that leads to the inability to provide milk for their offspring. This in its turn leads to early weaning which involves artificial feeding which is one of the most difficult undertakings in the tenement homes of the poor*". When the mother died, either during child birth or during the first year of the infant's life, then the impact on her child was likely to be severe. Loudon (1992) indicated that maternal mortality rates were approximately 4 – 5 per 1000 deliveries in the 1880s in England and Wales. He hypothesised that the major cause of death was puerperal infection by the streptococcus *pyogenes bacterium*, often transmitted to the mother by the practitioner assisting with the delivery. Practitioners were midwives (who were unlikely to be trained in the 1880s), medical practitioners or *ad hoc* monthly nurses. From a survey carried out at William Farr's request in the 1860s, it would appear that the majority of births in the major manufacturing towns were attended by midwives, whereas in the smaller towns a medical practitioner was more likely to be present. In the rural villages the situation varied across the country and depended on the availability of medical practitioners willing to be involved (Loudon 1992). Those doctors who took an interest in obstetrics joined the Obstetrical Society of London.

There was little mention of midwifery in Higham Ferrers from 1880 – 1890. Dr Crew, the MOH for the sub-district and public vaccinator after 1879, became a Fellow of the Obstetricians Society, London in 1877, but none of the other practitioners appear to have been members (Medical Directory 1881). In the sub-district CEBs, the presence of a 'nurse' in the house on census night was noted for 2 families, both of which contained an infant under the age of 1 month. [5] There were a further 9 women, six of whom were widows and one unmarried, whose occupation was listed as 'nurse' in the CEBs. The births / deaths of a further 9 infants were notified by a nurse according to the vaccination registers suggesting that the nurse was in residence at the time or supporting the family. During the 1880s there were 21 mothers (of 43 infants), who died between the birth of their last infant and the 1891 census. Only one mother, Annie Whitehead, was described in

[5] According to Loudon the terms midwife and nurse were used interchangeably until the Notification of Midwives Act in 1902.

the vaccination birth registers, as deceased at the time of registration of her daughter's death. For the other 20 mothers there is no information available to indicate if they died in childbirth or if there was a connection between maternal mortality and pregnancy.[6] Apart from Annie Whitehead's daughter only two other infants died, supporting Loudon's (1991) view that there was little correlation between maternal and infant mortality in the sub-district. There was however a strong link between mothers not notifying the birth of their infant and infant mortality. It cannot be known why they did not register the birth, but it would seem that either the infant was too ill to be left or the mother was herself unwell, since in general in the sub-district during the 1880s, this task was one performed by the mother. Notification of the need to have the infant vaccinated was given at the time of registration of birth and the information recorded by the vaccination officer in the vaccination birth registers. In Higham Ferrers 80% of births were notified by the mother, 19% by the father and the remainder, (<1%) were notified by others including nurses, attendants and relatives (Table 8:2).

Table 8:2 *Infant mortality rates of legitimate singleton infants born in Higham Ferrers 1880 – 1890 by person notifying the birth*

Notified by:	No. of Births	No. of deaths	IMR	NMR	P-NMR
Mother	2831	220	77.71	7.77	73.34
Father	679	113	166.42	91.31	82.66
Relatives	4	0	0.00	0.00	0.00
Attendant / Other	16	3	187.50	125.00	71.43
Not notified	32	25	781.25	593.75	461.54
Totals	3562	348	101.35	29.48	76.37

Source: 1881 and 1891 CEBs, CVRs

The IMR for those infants whose mother registered the birth and received notification of vaccination was much lower than that for any other group of infants (77:1000). Where the birth was notified by the father the IMR was high at 166:100 and the difference between mother and father notifications was highly significant ($p<0.001$) (Table 8:2). Mortality rates for infants dying in the first month were equally disparate, with the NMR for infants whose birth was notified by their mother, exceptionally low at 8:1000 compared to 91:1000 for those notified by fathers ($p=<0.001$). In contrast there seemed to be little correlation between those dying after the first month and the person notifying the birth, indicating that it was neonatal deaths that were responsible for the high IMR of father notified births (Table 8:2).

The average age at notification of birth in the sub-district was 38 days, but for those notified by mother the average age was 39 days, compared to 36 days for those notified by fathers and 34 days for nurses; indicating that the person who notified the birth was potentially an indicator of infant health, although there may be other, as yet unknown, factors. Of the 531 (15%) legitimate singleton infants notified within 28 days of birth, 92 (17%) died during the neonatal period – usually one to two days before the notification date and this too may have affected who notified the birth and death.

When all infants were considered, including twins and those who were born into single parent families, similar results were obtained (mothers 90:000, fathers 185:1000, others

[6] It may be possible to identify if there was a connection between child birth and maternal mortality from the parish registers but these were not available in an accessible form for this study.

574:1000) indicating that although illegitimacy and twin births had an impact on the rates, the previous association seen between notification and infant death was maintained (Table 8:3).

Table 8:3 *Infant mortality rates of all infants born in Higham Ferrers 1880 – 1890 by person notifying the birth*

Notified by:	No. of Births	No. of deaths	IMR	NMR	P-NMR
Mother	3549	320	90.17	9.86	81.10
Father	897	166	185.06	108.16	86.25
Relatives	20	7	350.00	250.00	133.33
Attendant / Other	30	9	300.00	233.33	86.96
Not notified	51	42	823.53	607.84	550..00
Totals	**4547**	**544**	**119.64**	**38.49**	**84.40**

Source: 1881 and 1891 CEBs, CVRs

These figures indicate that where mothers were not available to register the infant's birth for whatever reason, then infant survival especially during the first month was less assured. No other research has been found however with which to compare these findings or to indicate what the link is.

As seen before, the correlation between infant and maternal mortality was limited, but there were 16 infants whose fathers were listed as widowers in the 1891 CEBs for the sub-district (15 families) and had their birth registered by the father. One of the mothers of an infant for whom there was no notification date listed also died, as did the mother of an infant to whom notification was given by a nurse. The infant who was not notified died aged 30 days in 1883, but it is not known when the mother died. There is no evidence to support the theory that mothers did not register their infants birth because the infant was unwell, but the high level of neonatal mortality among infants whose birth were registered by others would seem to support this.

8:5 Multiple births

Whilst this chapter has concentrated on infants who were singletons, there is much evidence to indicate that the chance of survival for twins and triplets was significantly less than that for singletons.[7] According to Reid (2001) multiplicity of birth was one of the major influences on infant mortality at the beginning of the 20th century. Twin and triplet pregnancies have also been recognised as one of the precipitating factors of prematurity and/or immaturity (Loudon 1992; Wrigley et al.1997). Wrigley et al suggest that multiple births accounted for only 1.36% of all births but that the infant mortality rate was approximately 400:1000 live births - even when overall IMR was low. According to Reid (2001) the risk of death for twins was 8 times greater than that for single births. She suggests that this was because twins tend to be born earlier, were less mature and therefore more vulnerable following birth.

The situation in Higham Ferrers was little different, with an IMR of 587:1000 and an NMR of 434:1000 amongst multiple births. The 40 sets of twins and the one set of triplets accounted for 1.4 % of all births, but 10 % per cent of all infant deaths and 21 % of all neonatal deaths. The set of triplets all died within 3 days and 13 sets of twins also died during the neonatal period. A further two sets of twins had died by 35 days and 3 sets died

[7] Illegitimacy will be discussed in the next chapter.

during the post-neonatal period. In 11 cases one twin of the set also died during infancy. In total only 11 sets (27%) survived infancy intact and of these 3 sets were not listed in the 1891 CEBs although their families remained in the sub-district indicating that the twins may have died in early childhood. These figures are in keeping with Wrigley et al's findings and indicate clearly the difficulties experienced by twins. According to Wrigley et al (1997) most twin deaths occur within the first week; a finding again supported by the Higham Ferrers data. Of the 36 multiple-birth infants, who died within the first month of life, 24 infants did so within 6 days of birth and of these 11 infants died on the day of delivery.

Bryan (1992) in a study in Scotland in the 1980s indicated that all-male pairs of twins had a mortality rate of 61:1000 compared to all female pairs whose IMR was 49:1000. A later study found that the gender difference in mortality was minimal but according to Bryan this may have been due to better perinatal care. Wrigley et al (1997) also found that male/male twin pairs were more at risk than female/female twin pairs or male/female pairs. In part this may be due to the fact that in monozygotic twin pregnancies there is a known increased risk of congenital abnormalities leading to foetal or perinatal death (Bryan 1992; Wrigley et al 1997) but this does not account for the difference between all male and all female pairs. Reid (2001) suggests that when birth weight is controlled for, the difference disappears. Male infants are known to have a lower birth weight and are thus more vulnerable than females.

Wrigley et al (1997) found that the death rate in single sex twins was much higher than in mixed sex pairs, but although this was not the case in the Higham Ferrers data, with approximately 50% of infants dying in same sex groups and 62% of infants in mixed sex groups, the gender influence was strong. In the sub-district there were 10 sets of all female twins, 13 sets of all male and 17 sets of mixed gender. There were two females and one male in the set of triplets. There seems little doubt that for the male twin sets the chance of surviving beyond the first month was much less than for the other pairings, with infants dying in both the neonatal period in 6 of the 13 sets of male/male twins. In comparison in 2 out of the 10 all female sets both infants died and 5 of those born into male/female sets.

The IMR for males born into twin sets was 659:1000 whereas that for females was 538:1000. However, the numbers were small and the difference was not statistically significant for infant or neonatal deaths. On the other hand, the gender difference for singletons was statistically significant ($p<0.001$) indicating that the overriding influence for infants born in twin sets was multiplicity of birth rather than gender.

Bryan (1992) also indicated that the percentage of multiple births was associated with maternal age and that women between the ages of 30 – 39 were at greatest risk of a multiple birth. She suggested this resulted from an increasing ovarian activity before the menopause. This was found to be the situation in the Higham Ferrers study with the rates marginally increasing with maternal age and the difference between mothers aged 40+ and those in their 30s statistically significant ($p=<0.1$) The numbers involved were however very small (Table 8:4). Bryan also found an increase in infant mortality rates associated with maternal age but according to Wrigley et al (1997) the difference was minimal with the highest IMR in mothers aged 20 – 24.

Table 8:4 *Percentages of births and death represented by multiple births according to maternal age in Higham Ferrers, 1880 – 1910*

Maternal age	Births	Twin births	%	Deaths	Twin Deaths	%
Teens	200	2	1.00	29	2	6.90
20s	2069	31	1.50	208	16	7.69
30s	1348	24	1.78	167	16	9.58
40s	214	8	3.74	31	8	25.81

Source: CVRs

In Higham Ferrers the oldest group of mothers was small (214) but deaths of twins accounted for 26 % of the infant deaths they experienced. For many mothers in this group the twin birth was a later pregnancy, such as that of Phoebe Dickens. For her the twins were at least her 10th pregnancy when she was 40 years old, but she then went on to have two further children, who survived infancy.[8] The twins, Walter and Mabel, died aged 210 and 85 days respectively and were her only known twin set.

The only set of twins born to a teenager, were the illegitimate children of Mary Ann Knight who was 16 years old when they were born in January 1890. They both died on the day of delivery. Notification was given on the 21st January by a 'Mrs Underwood', so it may be that Mary Ann did not survive either. There is no further record of her as she does not appear in the 1891 census, but she may of course have married and changed her name.

Wrigley et al (1997) also indicate that the combination of being a twin and being first born greatly increases the risk of neonatal death. For those families where parity could be assured there were only 5 sets of twins in the sub-district who were seen to be first born and of these 50% died during the neonatal period – a figure in keeping with multiple births overall.

The majority of the sub-district multiple births (50.6%) occurred in Rushden (42 out of 83) and accounted for 2.06% of all Rushden births (Figure 8:4). Twin deaths accounted for 9% of all infant deaths in the town and 19% of all neonatal deaths, thereby contributing to the high NMR of 46:1000 during the 1880s. In keeping with maternal age profile of the town the majority of mothers of twin sets were in their 20s (7) or 30s (9). The only teenage mother of a twin set, Mary Ann Knight, was also found in Rushden. This contrasted with the other urban parishes of Higham and Irthlingborough where the situation for twins appeared to be poor, with infants having a greater risk of dying before their first birthday than those born in Rushden or the rural areas, although the difference was not statistically significant (Table 8:5).

Multiple births in Irthlingborough accounted for 11% of the infant deaths in the town compared to 2% of the births (Figure 8:4). Of the 10 sets of twins born during the 1880s in Irthlingborough, 7 sets had died during their first year and of those who survived a further 2 sets had 'gone' by the time of the 1891 census, although their families were still in the sub-district. Of the twin sets that died, 4 died during the neonatal period, with 1 set doing so on the day of birth.

[8] It is not possible to know exactly how many children Phoebe gave birth to, but using a combination of information from the 1881 and 1891 CEBs and the CVRs is possible to identify that she gave birth 12 times as a minimum. The twin set was the 10th.

Table 8:5 *Comparison of IMR and NMR for twins with those of singleton births in Higham Ferrers 1880 – 1889*

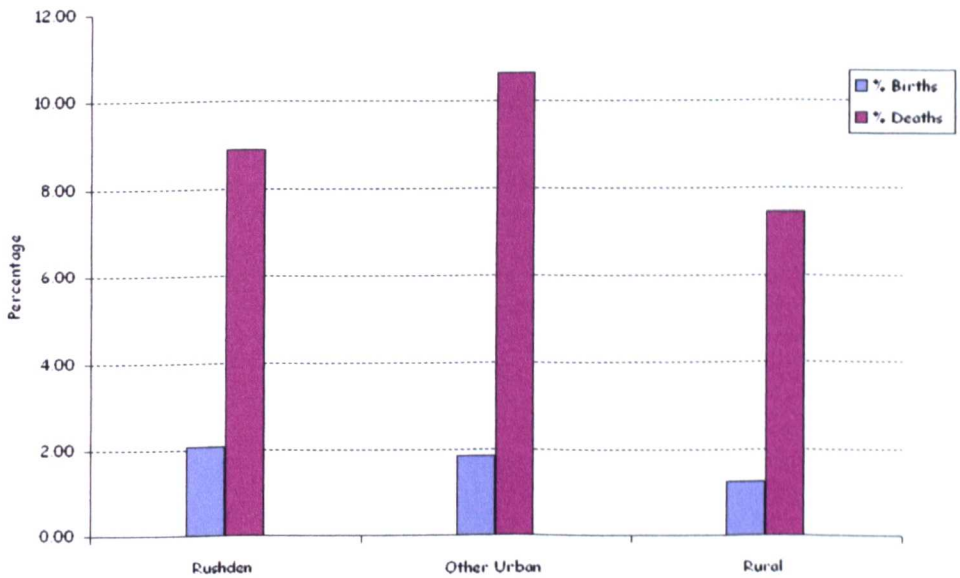
	Singleton IMR	Singleton NMR	Twin IMR	Twin NMR
Higham Ferrers	110.66	31.36	602.41	433.73
Rushden	128.39	37.61	595.24	428.57
Other urban [i]	98.24	26.68	620.69	413.79
Rural	93.25	25.72	583.33	500.00

[i] Other urban includes the towns of Higham and Irthlingborough

Source: CVRS

In Higham the situation was similar although the numbers involved were very small. The 9 infants included the set of triplets all of whom died within 2 days of birth and two other infants who died during the post-neonatal period. The mothers in Higham were younger than those in Irthlingborough where 2 were in their 20s, 3 in their 30s and Angelina Sherwood, who was aged 41 at the time of the birth of her twins – both of whom died on the day they were delivered.

Figure 8:4 *Comparison of the percentage contribution of twin births and deaths in each of the three areas of Higham Ferrers 1880 – 1889*



Source: CVRS

The twin sets born in the rural parishes included one set in Wymington and 5 sets in Irchester. Mothers were all in their 20s apart from Charlotte Ward who was 35 at the time of the twins' birth. They died during the neonatal period and Charlotte had no further children. She was not listed in the 1891 CEB, although her husband was found living on his own.

Conclusion

A number of influences associated with maternal health and welfare have been examined in this chapter, but it has not been possible to identify which of these were responsible for the urban effect evident in Higham Ferrers during the 1880s. In Higham Ferrers twin sets

were responsible for 21% of all neonatal deaths and contributed to the high rates of NMR found. Twins were however born throughout the sub-district and did not create the difference in infant mortality rates between Rushden and the other parishes seen in Figure 6:4. Although the average age of mothers was similar across the sub-district a larger proportion of Rushden mothers were in their 20s than elsewhere. As the mortality rates for infants born to this group of mothers was lower than for any other maternal age group, this would have worked to cancel out the higher urban rates of infant mortality. Lastly, in support of the findings of Loudon (1992), the association between maternal and infant mortality appears to have been limited, but that between the person notifying the birth and infant death was clearly evident. This new finding, attributable to the data source, may be an important indicator of maternal and infant health at the time of birth. Comparison with other settings to confirm the association is required but this information is currently only freely accessible from the vaccination birth registers.

Edvinsson et al (2005:334) indicate in their Swedish study that not all families have the same experience of infant death and that "*relatively few families accounted for a disproportionate number of infant deaths*". In the next chapter the characteristics of families into which infants were born in Higham Ferrers during the 1880s will be examined to determine how these impact on the urban – rural differences in the infant experience.

Chapter 9. The Experience of Infant Death in Families

Edvinsson et al (2005) and Das Gupta (1990) suggest that only a small proportion of high risk families were affected by infant death. What made those families vulnerable is unclear and many factors have been implicated. Garrett et al (2003) suggest that there is emerging evidence that certain women were more likely to experience infant or child deaths. Whereas Edvinsson et al (2005) suggest that socio-economic status of the family; its stability and the number of stillbirths were factors. King (1997) also suggests that migrant status was an issue, with those who were in-migrant to an area at risk, particularly if they lacked kinship links and therefore childcare support and advice. The factors contributing to the death of individual infants have been discussed in Chapters 7 and 8 and it may be that it was the combination of these within family groups that endangered the lives of some infants. In this chapter the experience of families in the Higham Ferrers sub-district, whose infants were born during the 1880s, will be examined to identify families at risk of infant death.[1]

9:1 Family groups

The 4547 infants born in the sub-district during the period from January 1880 to December 1889, were initially grouped into 2227 units based on father's name and occupation and the infant's place and date of birth (Table 3:4).[2] When the information from the CVRs was matched with that from 1891 CEBs, 3341 infants were observed in 1598 family units. Of these families, 1450 were found in Higham Ferrers in 1891 (Table 9:1). For 794 infants born in to 629 groups, no evidence was found of their families in any 1891 CEBs, although 15 infants were themselves found visiting or living with their grandparents (Table 9:1).

Table 9:1 *Summary of the observation of all family units linked to infants born in Higham Ferrers (HF) 1880 – 1889 and their experience of infant death*

	All	Observed in HF in 1891	Observed outside HF in 1891	Not observed in 1891	Conjugal family units	Single parent units
Family units	2227	1450	148	629	2106	121
Family units in which infants died	462	317	22	123	427	35

Source CVRS & 1881 and 1891 CEBS

Across the sub-district there was wide variation in the types of family units into which infants born during the 1880s were living in 1891. The majority were conjugal with both mother and father (2106), but some (121) were headed by a mother (Table 9:1). The latter family units included those headed by unmarried mothers, as well as those created as a result of the death of the father or their absence from the family home at the time of the census. There were also 'newly created' families, whilst others were more established,

[1] The term 'family' has been used to describe the unit in this study. In general this refers to a man, his wife and any living children, but it is recognised that this may have a different structure depending on the circumstances e.g. death of the mother or father. The term has also been applied to a lone infant or infants for whom no parent was evident, but in general the data relating to such infants has not been used in this chapter. For the purposes of this study relatives, servants, boarders and lodgers have not been included as part of the family unit, although it is recognised that they have an impact on the family environment

[2] See Chapter 3 for information on the compilation of the family database

with children born before the 1881 census.[3] Most fathers worked within the shoe industry, but others were employed in agriculture or a range of other occupations required to support a rapidly expanding population; such as builders, shopkeepers and teachers. The number of children born into a family also varied during the 1880s from 1 to 8 infants. This did not reflect the final size of the family, but indicated the variety of family-building histories that were found.

The majority of the family groups in the sub-district in 1891 were living in the urban parishes (77%), and 43% of all families were living in Rushden. In addition the majority of the infants of the 629 family units that could not be found in the 1891 CEBs, were mostly born in the urban parishes (89%); 50% of these in Rushden.

Of the 2227 family units identified from the CVRs, 462 (20%) experienced the death of at least one infant; a figure lower than that of the 33% of families found by Edvinsson et al (2005) in their Swedish study of families in the 1890s. The percentage of families experiencing a single infant death was however similar: 12% in Higham Ferrers and 10% in the Swedish study. Of the families that experienced the death of an infant 317 (69%) were observed in the 1891 Higham Ferrers CEBs, 22 (5%) families were located in parishes outside the sub-district, and 122 (26%) families could not be found in any 1891 census. (Table 9:1).

The percentage of families in Rushden experiencing infant death was higher at 24%, than in the other urban towns (20%) and in the rural parishes (17%) (Table 9:2). This suggests that either there were influences which adversely impacted on infants' chance of survival within the town, or that family units with a lesser chance of infant survival tended to migrate to the town.

Table 9:2 *Summary of the families in Higham Ferrers who experienced the death of one or more infants: 1880 - 1889*

	Higham Ferrers	Rushden	Other Urban	Rural
All families	2227	948	760	519
Families experiencing death	462	224	151	87
Percentage	21%	24%	20%	17%
x1 death	369	175	122	72
x2 deaths	80	39	28	13
x3 deaths	7	6	0	1
x4 deaths	6	4	1	1
Single-parent families	121	44	35	42
Single-parents exp. death	35	16	9	10
Percentage	29%	36%	26%	24%

Source: CVRs

The number of infant deaths within a family also varied; 369 (80%) of families

[3] 'Newly created' families were those for whom there was evidence that the man was unmarried in 1881 and that marriage occurred during the study period. It is recognised that there may have been other newly created amilies among those families who were not observed in either CEB because the information about the father is not available. See Chapter 9 for more detail.

experienced 1 death, 80 (17%) of families 2 deaths, 7 (2%) of families 3 deaths and another 6 (1%) families experienced 4 infant deaths during the decade. Of the 93 families in which more than one infant died, 49 (53 %) were found in Rushden, potentially contributing to the higher rate of infant mortality in the town (Table 9:2).

In the ensuing discussion the 121 families identified as being headed by mothers have been discussed separately because their situation tended to be more complex.[4] Many of the mothers were very young when they had their first child and were therefore still children themselves in the 1881 census making them far more difficult to identify with confidence. Several also moved out of the area leaving their children behind with grandparents and some married or remarried, again making positive identification difficult without recourse to parish registers, which was beyond the scope of this study. For these reasons and because of the disparity in life chances afforded to the illegitimate infant, the 121 families have been analysed separately from the other 2106 conjugal families.[5]

Similarly it is recognised that for those infants for whom no information related to their parents could be found, the information is less robust and has been used where relevant for comparison with other groups, but with caution. In all other cases the infant was known to have survived their first year or died before their first birthday.

9:2 Migration

The impact of migration status is one of many factors that have been said to adversely influence the life chances of infants (King 1997). Clark (2003) found that the experience of infant mortality among transient families in rural Kent was significantly worse than for those families who were more settled in an area. In Higham Ferrers in-migration was clearly a feature of the 1880s with an increase of 36% (4298) in population. As discussed in previous chapters, the majority of this increase occurred in Rushden where the population increased by 103% between 1881 and 1889 (Table 6:1).[6]

Although all 2106 conjugal families, including those that were 'newly created', were living in the sub-district at the time of the birth of their infants, born between 1880 and 1891, a third left before the 1891 census (710), whilst the majority (1396) remained at least until 1891 (Table 9:3).

Table 9:3 *Observation points of conjugal family units in the 1881 and 1891 HF CEBs whose infants were born in Higham, 1880 – 1889*

Family units	Observed in 1881 & 1891CEBs	Observed only in 1891 CEBs	Only observed in 1881 CEBs [i]	Not observed in 1881 or 1891 CEBs
2106	982 (47%)	414 (20%)	151(7%)	559 (27%)

[i] 112 of these families were also found in 1891 CEBs outside Higham Ferrers

Source CVRS & 1881 and 1891 CEBS

[4] This group contained unmarried mothers and those who were widowed or separated from their husbands for a variety of reasons including employment. This latter was especially true of rail workers.

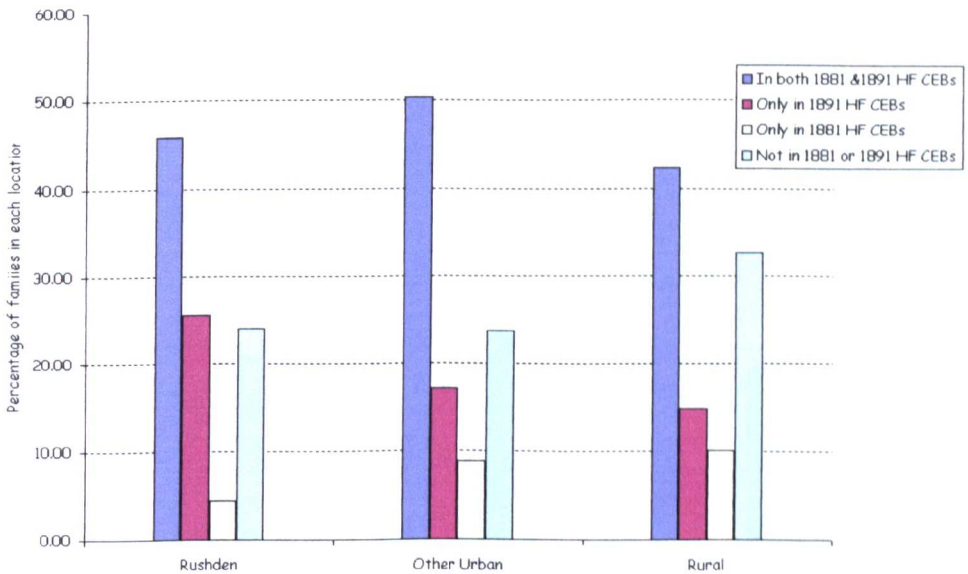
[5] Those families headed by a single father were not however discussed separately because 1) if there was an infant present at the time of maternal death /absence it is likely that a surrogate mother would have been found to care for the infant 2) from the information available to this study it was not possible to identify when mothers died / left.

[6] The population of the sub-district rose from 10,783 in 1881 to 15,072 in 1891. In Rushden the population rose from 3657 to 7445.

The smaller number of families who left the area would seem to be indicative of the employment opportunities in shoemaking. This was particularly true of the 569 newly created families for whom the tendency to stay in the sub-district was much greater with only 17 (3%) families leaving before 1891. Those families who remained in the sub-district were however not representative of the population as a whole because they were all parents of children born between 1881 and 1891 and according to Woods (1996) families with young children are least likely to migrate, which would seem to be the case here. Additionally, few leavers had more than one child and it would appear that, as indicated by Garrett et al (2001), once children were born, migration was less likely to occur unless 'pushed' by economic factors. Among those families who remained in the sub-district there were 982 families who had been present in the 1881 CEBs and 414 who arrived after 1881. Similarly among those who left, there were families who were present in the sub-district in 1881 (151), but the majority (559) arrived after the 1881 census and left before the next (Table 9:3).

The percentage of families who stayed until 1891 differed in individual parishes with 71% of the families in Rushden staying, compared with 67% in the other towns and 57% of rural families (Figure 9:1).

Figure 9:1 *Comparison of the migration status of conjugal families in the urban areas and rural parishes of Higham Ferrers, 1880 – 1889* [i]



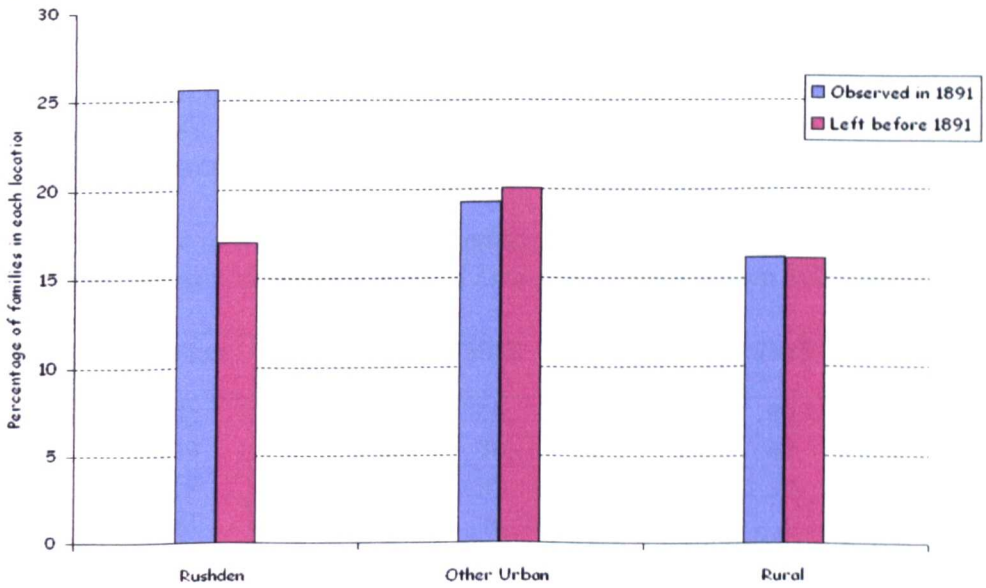
[i] Other urban: Higham and Irthlingborough; Rural: Farndish, Irchester. Newton, Podington and Wymington
Source: 1881 and 1891 CEBs

The percentage of families who arrived in the sub-district after the 1881 census also varied with 25% of 'new' families moving into Rushden - reflecting the trend in population growth and employment opportunities (Figure 9:1). In the other areas a smaller percentage of families of the other urban towns moved in after 1881 (17%) and in the villages only 14% of the families were in-migrants. The opposite pattern was seen among those who had been in the sub-district since 1881 but subsequently left, with only 40 (4%) of Rushden families who had children born during the decade, leaving. In contrast, in the rural parishes 10% of families left and in Higham and Irthlingborough 9% of all families within the towns migrated out. In the villages the percentage of families who were transient was also much higher at 33% than in the urban areas where 24% of the families were not observed in either census (Figure 9:1).

Of the 2106 conjugal family groups, whose infants were born in the sub-district between 1880 and 1889, 427 (20%) experienced the death of one or more infants. Although those who stayed in the sub-district until 1891 were in observation longer and all their infant deaths contributed to the statistics unlike those who moved away, the difference between those who stayed and those who left was not significant. However, when the number of infants born into a family were controlled for, and only those who experienced the birth of a second child during the 1880s were included, it was found that the difference was statistically significant ($p=<0.1$) with 19% of families who were present at the time of the 1891 census experiencing infant death compared to 27% of those who left the sub-district.[7] These results would suggest that the experience of infant death was greater among those who subsequently left the area and may have contributed to the out-migration of the family – either by freeing the family to move or creating a positive reason for moving.

When the infant death experience of 'staying' families in each of the locations of the sub-district were compared, the difference between Rushden families and those from the other parishes was highly statistically significant demonstrating that living in Rushden represented a greater risk for their infants ($p=<0.001$). 'Staying' Rushden families were also more likely to experience infant death than 'leaving' families (Figure 9:2) The results were again highly statistically significant ($p=<0.01$) and contrasted with the rural and other urban families where the experience of infant death was similar for both those who stayed or left (Figure 9:2).

Figure 9:2 *Comparison of families' experience of infant death in the different locations of Higham Ferrers according to migrant status.*



Source: CVRs and CEBs for 1881 & 1891

As before, these results may be affected by families who stayed being in observation longer and when analysis of two-infant families was carried out a different pattern emerged with 17% of those who stayed in the sub-district experiencing infant death compared to 32% who left. This supports Clark's (2003) findings that transience was a factor in infant mortality. The numbers involved were small however and the difference between those who stayed and those who left was not statistically significant. In Rushden this was not the case and among two-infant families, 21% of 'stayers' and 'leavers' experienced infant

[7] The first two infants born into a 'legitimate' family group during the 1880s were included in the analysis. The infants included may not have been the first infants born to the family if children had been born in the previous decade.

death. Other factors such as the environment or the lifestyle of those families, who remained in the town, may have adversely influenced their experience of death. Whilst, as identified by King (1997), in-migration may also have influenced infant survival, since family support networks may have been limited, the majority of heads of households born outside of the sub-district had in fact only travelled short distances (Figure 6:1).

9:3 Family Size

The final size of a family is seen to be a factor in infant mortality but the relationship is complex and confused by variables such as the age of the mother. Those who commenced childbearing at an early age, or who continued longer, having greater risks than those whose childbearing took place in their 20s or 30s (Garrett et al 2001). Maternal health and welfare was also influenced by the number of children and birth intervals and thus had consequences for the infant's chances of survival (Das Gupta 1990). Garrett et al found that, '*The association of parity with child mortality is so strong that differences in parity between certain groups may help to explain the differences in mortality between them*' (Garrett et al 2001:162). This finding is similar to that of Knodel (1988) who indicated that the total number of children born to a mother was closely related to infant mortality with an increasing number of children associated with an increasing risk of infant death.

It was not possible to identify final size of Higham Ferrers families from the data sources, because the families were only in observation for 10 years and therefore infants born before and after the period could not be included. It was possible however, to make comment on the family experience of infant death and the family building strategies during the decade.

The mean number of infants who were observed to first birthday or died during infancy and were born into the 1408 conjugal family units who stayed in the sub-district during the decade to 1889, was 2.1.[8] This figure masked a wide variation, with families observed to have had between 1 and 8 children in the 10 year period (Table 9:4).

Table 9:4 *Size of the families that remained in observation until the 1891 census in Higham Ferrers by year of birth of 1st infant born between 1880 and 1889*

Family size	Families	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
1	493	44	45	29	30	12	24	31	49	100	129
2	329	35	46	30	21	28	41	56	51	20	1[i]
3	269	43	62	37	39	31	30	18	9		
4	183	55	52	36	20	14	3	2	1		
5	94	42	28	15	7	2					
6	33	16	13	4							
7	4	3	1								
8	3	3									
Totals	1408	241	247	151	117	87	98	107	110	120	131

[i] The 1st infant of one family was born in February and the 2nd in December 1889

Source: 1881 & 1891 CEBs and CVRs

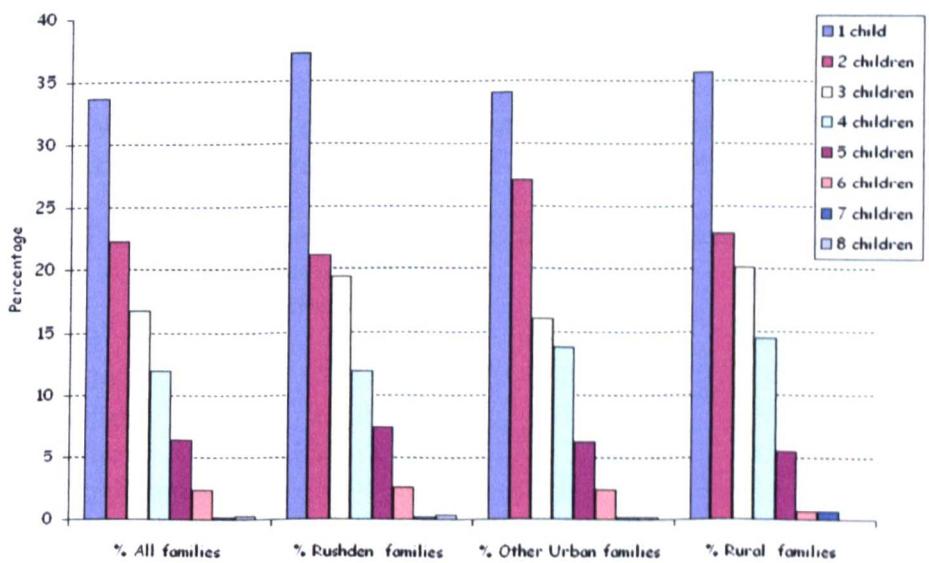
The 3 families of 8 children born during the 1880s were those of Jeremiah Rice and his wife Annie, who also had 2 other children before 1880 and a further 4 daughters born

[8] This figure included 12 families who were not present in the 1891 CEB but gave birth to infants before 1890.

during the 1890s and Jeremiah's brother Henry Rice and his wife Eliza. They also had 2 children before 1880 and a further 2 children during the 1890s. Both families lived in Rushden and Jeremiah and Henry were shoemakers. Two of Henry's infants died and one of Jeremiah's. The third family with 8 children (with no deaths) was that of Owen Cox, a farm labourer from Higham, and his wife Harriet. This variation in childbearing patterns with some families producing only 1 or 2 children whilst 40 produced 6 or more was in part attributable to the length of time the family was in view during the decade (Table 9:4). For example for many of the 493 families with only one child born during the early 1880s, the child was the last-born of a much larger family created before 1880. Similarly at the end of the decade there were a large number of families, particularly in-migrants to the area, having their first infant.

Across the sub-district there was little variation in the pattern of family size with approximately 35% of families in each of the locations having only 1 child born between 1880 and 1889 (Figure 9:3). In Higham and Irthlingborough, two-infant families formed a greater percentage (27%) of the total families than in Rushden (20%) and the rural parishes (24%), but there were fewer three-infant families (Figure 9:3). This variation in rate may also be due to the length of time families stayed in the sub-district and as seen in Figure 9:2 less families migrated out of Rushden than in the other parishes and therefore potentially had a greater length of time to build a larger family. However the impact on imfant mortality rates of families staying in Rushden may have been counteracted by the number of young families moving to the town who only had the opportunity to produce 1 or 2 children.

Figure 9:3 *Percentages of families in Higham Ferrers by numbers of children born between 1880 and 1889*



Source: 1881 & 1891 CEBs and CVRs

According to Garrett et al (2001) families with young children were least likely to migrate. This cannot be ascertained from the Higham Ferrers data because the age of children at migration is unknown. However of all the families who produced children during the decade from Table 9:5, it can be seen that 51% of all one-infant families left the sub-district before 1891. This compared with 27% of families with two children and 14% of families with 3 children. Less than 10% of all families with four or more infants born during the 1880s had moved by 1891. From the data it is not possible to identify when or

why families left the sub-district, but it is clear that once children were born to a family the opportunity (or the willingness) to move was less.

Table 9:5 *Percentages of families according to family size who left before 1891 and had children born between 1880 and 1889 in the Higham Ferrers sub-district.*

Family Size [i]	Families [ii]	% of all families	Number of families that left	Families leaving as a % of all families	Percentages of families of each size that left
1	1001	47.53	508	24.12	50.75
2	448	21.27	119	5.65	26.56
3	313	14.86	44	2.09	14.06
4	203	9.64	20	0.95	9.85
5	100	4.75	6	0.28	6.00
6	34	1.61	1	0.05	2.94
7	4	0.19	0		
8	3	0.14	0		
Totals	2106		698	33.14	

[i] This is the size of the family created in the 1880s and does not include infants born before 1880
[ii] This table includes all families in Higham Ferrers apart from the 35 headed by a mother

Source: 1881 & 1891 CEBs and CVRs

Knodel (1988) indicated that the larger a family, the greater potential there was for infant death and this was demonstrated when the infant mortality rate of the children born into the 1408 families was explored (Table 9:6). It was seen that the mortality rate of infants born into families of 5 or more children, despite the smaller numbers involved overall, was significantly higher than that of smaller families ($p=< 0.001$) and the risk of the family experiencing infant death grew with each additional child.

Table 9:6 *Experience of infant death among all conjugal families observed in HF sub-district in 1891, according to number of children born during the period 1880 – 1889*

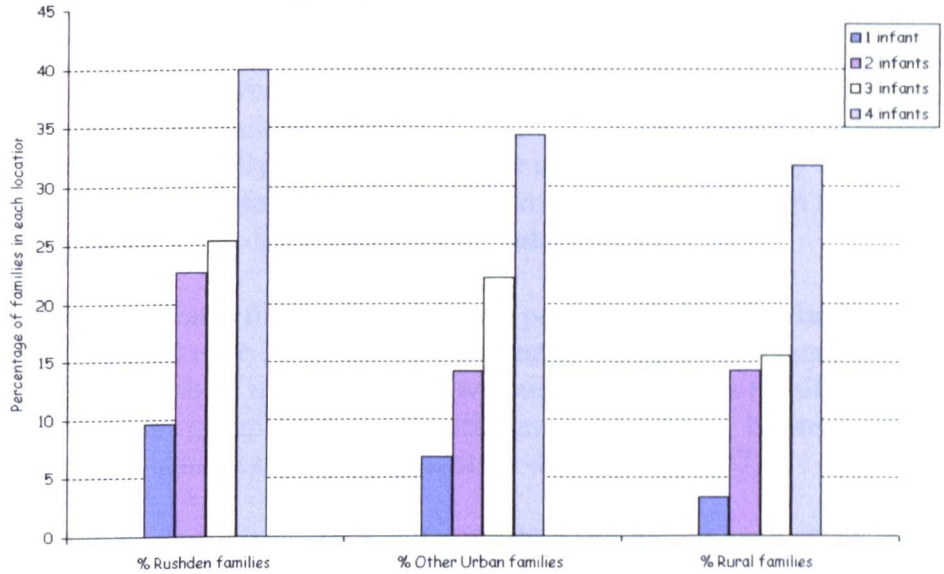
Size of family	Percentage of families exp. infant death	No of infants [i]	Infants deaths	IMR
1 child	7.51	493	44	89.25
2 children	17.63	658	73	110.94
3 children	22.30	807	79	87.94
4 children	36.67	732	90	122.95
5 – 8 children	50.00	720	123	170.8
Totals		3410	409	119.94

[i] This includes all infants born into the 1408 conjugal family units who stayed in the sub-district until 1891

CVRs and 1881 & 1891 CEBs

Despite the general similarity in the pattern of distribution of families according to size across the sub-district, the experience of infant death varied between parishes. Of the families who stayed in Rushden the percentage who experienced infant death was higher than for the families who stayed in either of the other areas, regardless of size (Figure 9:4).

Figure 9:4 *The percentage of families according to size who experienced infant death in Higham Ferrers during the period 1880 – 1889 and were in observation until 1891*



Source: CVRs and 1881 & 1891 CEBS

The difference in the experience of infant death between one-infant families in Rushden and the rest of the sub-district was statistically significant ($p=<0.01$), as it was for two-infant families ($p=<0.05$). The difference however was not significant between larger families of 4 or more infants in Rushden and those elsewhere in the sub-district. This would suggest that family size was not as influential in causing infant death as being born in Rushden for small families, but as the number of children increased so did the risk of infant mortality, regardless of the environment. This may be attributable to birth order with those born later in a family being weaker than their earlier siblings or more at risk from contact with infectious diseases than their siblings were during infancy.

9:4 Birth Order

As well as the size of the family being an influential factor in the mortality patterns of their offspring, so too was the birth order of the infants. Heady et al (1955) found that infant mortality was in general higher for the first child born to mothers in all age groups. Reid (2001) suggested that this may have been due to the fact that first deliveries take longer. Hart (1998) too found that the first born was at greater risk than any subsequent children apart from the 4th born, but Anderson (1998) found that as family size increases, the risk for the infant who survives the first month of life, decreases until the 5th child. In addition Reid (2001) also indicated that there was a classic J- shaped (or tick-shaped) pattern of mortality with parity among the infants she studied in Derbyshire in the early 1900s, and that mortality was lowest for parities 2 and 3. From the Higham Ferrers data it was not possible to conclusively identify all first born children because detailed information was only available from 1880 – 1889, but using the CVRs and the CEBs for 1881 and 1891 a limited number of families who had their first infant during the 1880s could be identified. Families were removed from the sample if there was evidence of children born before 1880 or evidence from the infant deaths registers (which were available from 1874) of infant deaths before 1880. This significantly reduced the numbers of families and infants available for analysis, but allowed exploration of the impact of birth order on infant survival as all first born infants could be identified. There were 1619 infants who were born into 708 conjugal family units observed either in the 1881 CEBs or identified as being 'newly created' during the 1880s.

There was little evidence from this data-set that first born children *per se* were more at risk than their siblings although neonatal mortality rates were higher than for 2nd born infants (Table 9:7). The difference was not however statistically significant. The infant mortality rates for infants born 2nd were found to be higher than for those who were first born, as well as for those who were third born. This finding although similar to that seen when the incidence of mortality for one-infant and two-infant families was explored was not however statistically significant. For the neonate the mortality rate was the same for both 2nd and 3rd born infants indicating that any difference between the groups resulted from exogenous factors during the post-neonatal period.

The survival rates for the 4th child were poor – a finding similar to that of Heady et al (1955). There were 131 births and 29 deaths within this category of infants and therefore the small numbers involved may have contributed to this result, but nonetheless 22% of the infants in this group died, and the difference in mortality between 3rd and 4th born infants was highly statistically significant at p=<0.001 (Table 9:7).

Table 9:7 *Comparison of infant mortality according to birth order for infants born in Higham Ferrers from 1880 – 1889*[i]

Birth Order	Births	Deaths	IMR	NMR
1st	708	65	91.81	38.14
2nd	448	47	104.91	35.71
3rd	252	22	87.30	35.71
4th	131	29	215.38	84.62
5th – 8th	81	12	148.15	61.73
Totals	1619	174	107.47	

[i] All infants observed to first year or death before first birthday

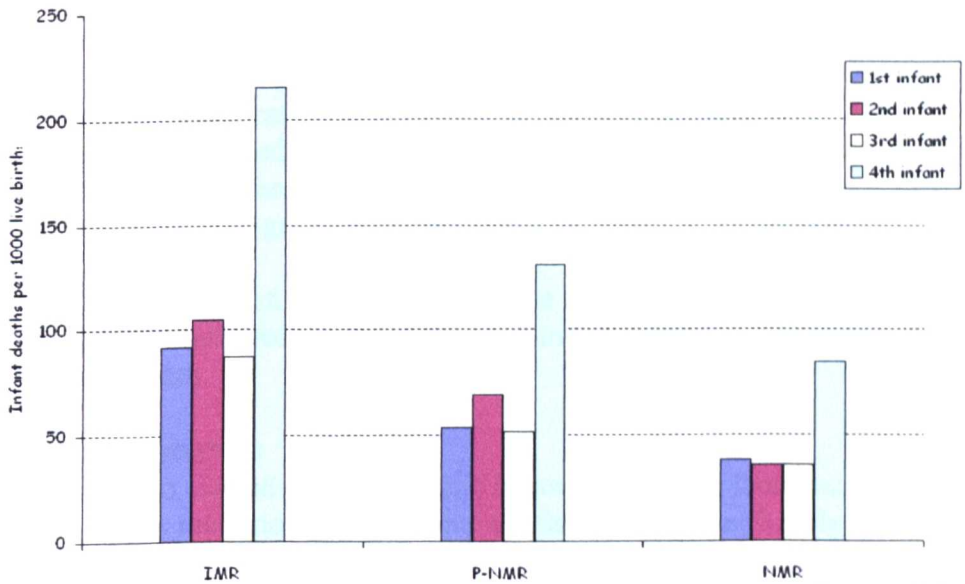
Source: CVRs and 1881 &1891 CEBs

There was no clear evidence from the data to indicate why the chances of survival for this group of infants born 4th in the family were so poor. The families into which they were born varied in size with 71 of the 4th born infants being the last born before 1891. There were also 40 deaths among 4th born infants in 5-infant families, 16 in 6-infant families, 2 in 7-infant families and 1 in an 8-infant family. When the rates of post-neonatal mortality and neonatal mortality of all infants were compared a similar pattern was seen to that of overall infant mortality, with a marked increase in rate for 4th born infants.

Infants who were born 4th in Rushden families were also seen to be more at risk than their siblings, with a third dying before their first birthday. This compared with 14% of 4th born infants born in the other urban towns and 16% in the rural parishes. The reason as to why 4th born infants in Rushden should be so much more vulnerable than in the rest of the sub-district is not clear from the data. On the other hand, as seen earlier the older siblings of 4th born child may have been of school age and increased the opportunity for the infant to contract infectious diseases. This does not explain however the difference seen between fourth-born and those born after who will have been subject to the same level of risk. The increase in mortality for 2nd born infants, evident among those dying after the first month was not apparent among neonates, indicating that this rise in rate was brought about by influences which impacted on the older infant (Figure 9:5). The neonatal mortality rate for 2nd born infants was actually lower than that for 1st born infants, but the numbers were small and the results not statistically significant. Similarly the numbers of infants born 5th

in the families were very small (57) but the pattern was similar to that of 4th born infants.

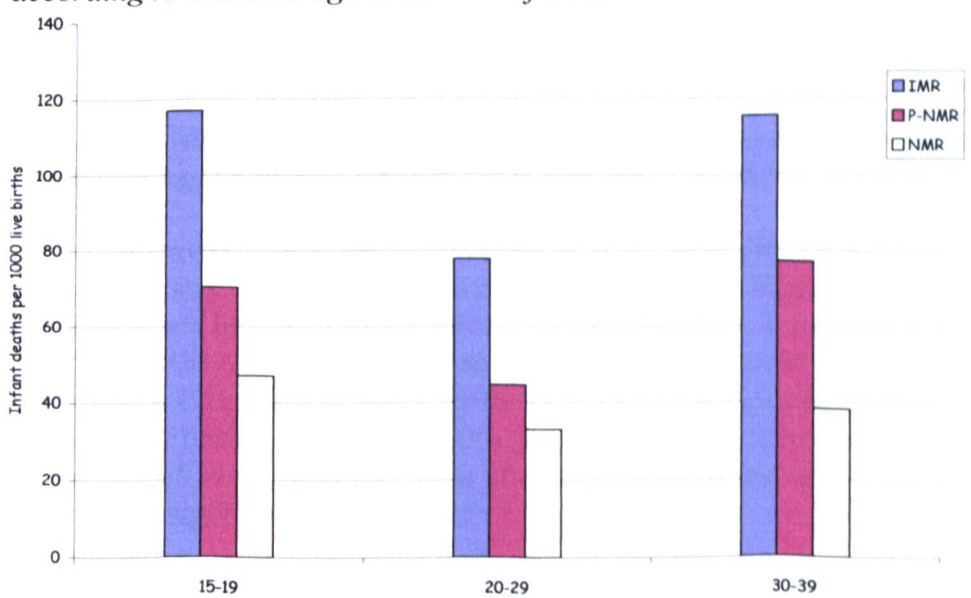
Figure 9:5 *Comparison of IMR, P-NMR and NMR according to birth order in Higham Ferrers between 1880 and 1889*



Source: CVRs / 1881 & 1891 CEBs

Whilst the association between infant mortality and birth order is evident, Heady et al (1955) also indicate that there was an association between birth order and maternal age, with infant mortality rates falling as mother's age increased for a given number of children. They found in their study that the highest infant mortality rates occurred among first born infants of teenage mothers - a finding similar to that of Smith et al (2003). They also indicate that the post-neonatal mortality rate rose steeply for infants born to mothers under the age of 25 years.

Figure 9:6 *Comparisons of the rates of IMR, P-NMR and NMR for first born infants according to maternal age at the time of birth*



Source: CVRs and 1881 & 1891 CEBs

Within the sub-district the majority of the 708 mothers for whom the first-born was

identifiable, were aged between 15 and 29 at the time of the birth of their first infant. The number of births by age was: 15 – 19 years - 128; 20- 29 years – 515; 30 – 39 years – 52; 40 – 49 years – 5. There were also 8 mothers whose age at the time of the birth of their first infant could not be determined because they had died by 1891 and were unmarried in 1881 and therefore very difficult to recognise with any degree of certainty.

The findings support the view that both neonatal and post-neonatal mortality rates of 1st born infants to teenage mothers were higher than for mothers in their 20s, but post neon-neonatal mortality rates were highest for mothers in their 30s (Figure 9.6) This finding supports that of Heady et al (1955) who indicated that mothers aged 35+ have an increased risk of firstborn infant death. The numbers were small however and there were only 16 mothers in this age group who had their first infant in the sub-district during the decade.

It would seem therefore from the data that birth order was an influential factor in infant death, particularly for those infants born in large families in the sub-district and especially for the 4th born.

9:5 Birth Intervals

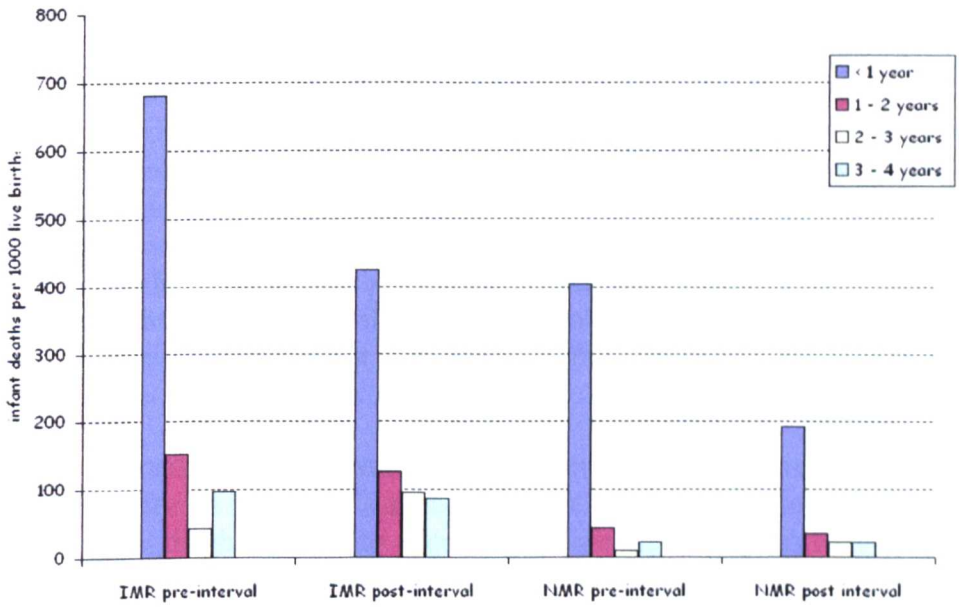
According to Garrett et al (2001) the major influencing factor as far as family size is concerned is the time taken to create the family. In some families, birth intervals may be long and pregnancies well spaced, yet the final family size large. For others, the inter-pregnancy intervals were very short. Short intervals were hazardous both for mother and child because frequent pregnancies with little time to recover between them, led to a mother whose health was depleted and who may have been unable to produce sufficient breast milk for her new baby (Das Gupta 1990; Smith et al 2003). For both the infant opening and the infant closing a short interval of 15 months or less, there are indications that mortality rates were higher than for those for whom the interval between one birth and another was longer (Garrett & Davies 2003; Smith et al 2003).

In Higham Ferrers there were 1007 conjugal families who had more than one singleton birth during the 1880s and whose 3105 legitimate infants from the CVRs and CEBs were known to have survived infancy or died before first birthday.[9] The average interval was found to be 26.6 months which was slightly longer than that of 25 months found in Skye and Ipswich by Garrett & Davies (2003) for the 1880s. In total within the 1007 families, 350 infants died – 246 children after a sibling. Intervals calculated from one birth to the next ranged from 247 days or 8.2 months to 3545 days (9.8 years). The shortest interval was that between Emily Brown and her sister Maud, who was born 247 days before Emily. Maud died aged 134 days and her sister died aged 149 days.

Garrett & Davies (2003) found that rates of infant mortality were significantly higher when the interval was less than 1 year - a finding replicated in Higham Ferrers. The IMR was however much higher in Higham Ferrers than that found in Ipswich and Skye (209:1000), but this may be an attribute of the small numbers involved in this study. There were 47 infants born 12 months or less after the birth of the previous sibling, of whom 20 died (IMR = 425:1000; NMR = 191:1000) (Figure 9:7). The difference between those born after an interval of 1 to 2 years and those after an interval of less than 1 year was highly statistically significant (p=<0.001).

[9] Of the 1598 families observed in 1891 there were 39 that included twin births and 552 had only one child born during the decade.

Figure 9:7 *Comparison of infant mortality and neonatal mortality of infants born before and after a specified birth interval in Higham Ferrers, 1880 – 1889*



Source: CVRs / 1881 & 1891 CEBs

The mortality rate of infants born before the short interval was significantly worse than for those born after. Of the 47 born before an interval of less than one year, 32 died (IMR = 680:1000; NMR = 404:1000) and again despite the small numbers involved, the results were highly statistically significant (p= <0.001), supporting the findings of Smith et al (2003) (Figure 9:7).

Garrett and Davies (2003) also found that the IMR rose again for intervals between 3 and 4 years, indicating that an, as yet unknown, factor comes in to play for infants born after an interval of this length. Garrett and Davies suggested that it may result from a 'missed' birth - one ending in miscarriage or stillbirth. A rise in infant mortality rates for intervals of 3 to 4 years was also seen in the Higham Ferrers data, but among infants born before an interval rather than after (Figure 10:7). It may be that this too resulted from a miscarriage or an unregistered stillbirth, but it was not possible to assess this from the data.
The distribution of birth intervals across the sub-district was similar, except for those infants for whom the interval between births was less than a year. In Rushden 2% of the infants were born after an interval of less than 1 year, compared to 0.7% in the other parishes. As the life chances for these infants were very poor, this would have adversely impacted on the rates of infant mortality within the town. The numbers of infants involved in the other parishes was however very small and even when combined were too small for statistical analysis. The infant mortality rate for infants born after an interval of between 1 and 2 years was also high in Rushden at 147:1000 compared with the other towns (112:1000) and the villages (91:1000) and the difference between Rushden and the other parishes was statistically significant (p=<0.02).

The reason for short birth intervals within individual families is unclear and may be the result of a number of factors impacting on either infant. Smith et al (2003) found that 10% of mothers in their study, who had an inter-pregnancy interval of less than 18 months, had experienced a perinatal death in the earlier pregnancy. An early death would 'free' the mother to start a new pregnancy since she would not be breast feeding or caring for the infant. This might have been the situation for Samuel Elmer, a Rushden shoemaker, and

his wife Sarah who had babies born after intervals of 708 days, 735 days, 751 days and 787 days. The last of these died aged 8 days and the next child was born after only 365 days in 1889 and survived to 1st birthday.

In the Higham Ferrers study, of the 47 infants born after an interval of less than 12 months, 32 (68%) were born after the death of the infant opening the interval. Of these 32 deaths, 19 occurred in the neonatal period, 8 within the first week. However as only 7 of the 32 infants themselves survived, there may have been other factors within the family that led to the infant deaths. One of these families was that of Gilbert Church whose first child died aged 20 days in March 1880 and Julia, his 2nd, in December 1880 aged 16 days – 322 days (10.2 months) after the birth of the first child. Julia's death was followed by an interval of 14.8 months and the next infant survived, as did the fourth after an interval of 17.9 months. Without cause of death data however it is not possible to identify why the first two infants died.

Short intervals may also result from the premature birth of the infant following an interval. '*Prematurity*' as a diagnosis appears to have been used in the 19th century to define early or perinatal death from births occurring before the infant was fully ready to emerge and according to Williams and Galley (1995) accounted for 10% of all infant deaths. [10] Various factors have been put forward to account for prematurity, but according to Newman (1906) prematurity was attributable to the ante-natal condition. He wrote that '*it is evident that if infants die within a few days or hours of birth or even if dying later show unmistakeable signs of being unequal to the calls of bare physical existence, that there must be something more than external conditions or food or management which is working to their hurt*' (Newman 1906:62). However, the expected date of birth is not available to determine whether infants were born prematurely.

Although multiple births have been seen as a cause of prematurity and the chance of survival for twin sets was very poor, twin sets were not seen to be the cause of short intervals within the sub-district. Of the 39 twin sets none were born within a year of the previous sibling and only 8 born within 1 to 2 years. For the siblings born after a twin set, 7 were born within 1-2 years, but none within a year of the multiple birth. In fact among the siblings of infants born into families where there was a twin set only 3 died – all in the post natal period and all after intervals of two or more years indicating that despite the fact that 47 of the twins died, the other infants born into these 39 families were very healthy.

It was seen previously that the 2nd child born into a family in Higham Ferrers suffered a higher rate of mortality during infancy than those born first or third. As 51% of the 47 births associated with an interval of less than 12 months, were the 2nd child and of these 30% died, this may have been a factor in the high mortality rates of 2nd born infants. Conversely the cause of the high rate of death among 2nd born infants may have contributed to the short birth intervals.

Not all infants who were born after a shorter interval than the sub-district average of 26.6 months died however, and in some families, short intervals would seem to have been the norm. An example was the family of George Waller who had 3 children between 1887 and 1889 with intervals of 11.9 months and 12.6 months respectively. All three children survived to their 1st birthday and for these infants and for the many others born before or after a shorter interval within the sub-district, the length of time between births was not a

[10] Prematurity appears to have been used to refer to deaths occurring prematurely in the first days and weeks of life but is rarely defined in the literature. As Medical Officers of Health in Rushden appear to use the term in this way, this use has been adopted throughout the study (Crewe 1899).

hazard. This would seem to indicate that it is not the short interval *per se* that resulted in death, but instead short intervals in combination with other factors such as the health of mother or siblings, family size and birth order, influenced the infant's chance of survival. The urban effect was also evident, with infants in Rushden experiencing higher rates of infant death associated with a short interval than those born elsewhere in the sub-district.

9:6 Occupation

Social class, as defined by fathers' occupation, has been found to have a significant impact on infant mortality rates with those in professional classes having a lower rate of infant mortality than other occupational groups (Watterson 1986). However this relationship may not be simple, as social class may dictate the environment in which the family lives as well as the lifestyle of its members and in turn these may independently impact on the family's experience of infant death (Williams 1992). The infant's chance of survival may be affected by the income level and type of work undertaken by the parent, and the impact of industrialisation processes on the environment. Garrett et al (2001) also found that in single-occupation communities where everyone behaved in a similar way, the impact of social status was largely lost.

Information on occupations of heads of the 1560 conjugal families whose infants were born in the sub-district during the 1880s and who were observed in the 1891 CEBs, came from both the 1881 and 1891 CEBs and the combined vaccination registers for the area.[11] Higham Ferrers sub-district was at the heart of the shoemaking industry in Northamptonshire and shoemaking was the major form of employment in the area with 972 (62 %) of families headed by a shoemaker in 1891. A further 215 (14%) were engaged in agriculture. The other main occupations involved men working in building, trade or shop-keeping, together with professional groups such as doctors, dentists and clergy. Ironstone workers were found in Irthlingborough where there were several quarries, and rail workers in Wymington – the site of a large rail development during the 1880s. For the purpose of this study this group were known collectively as 'other occupations' because individually they were too small for analysis.

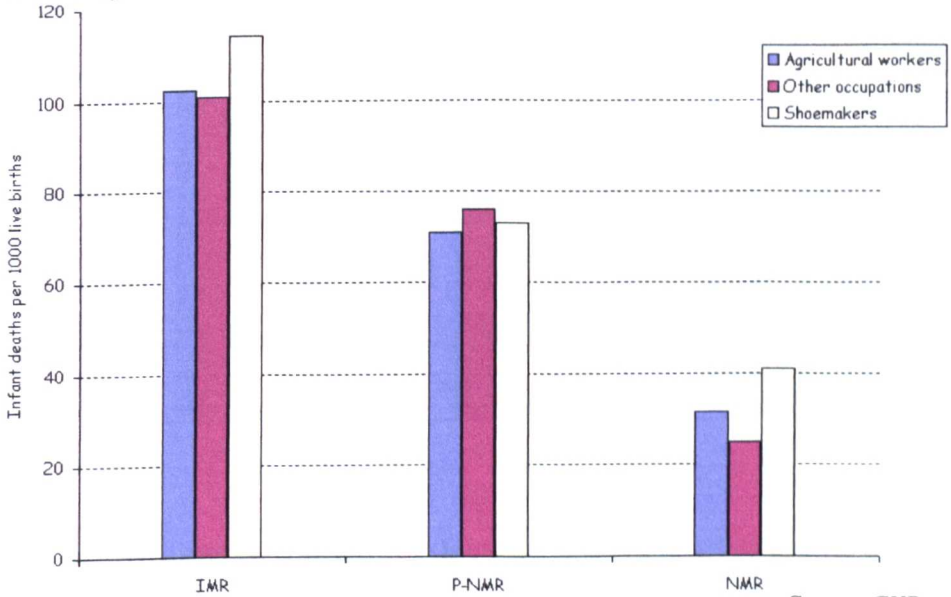
Determination of social status from the description of occupation was problematic because on occasions it was difficult to ascertain exactly what work the man did from the description in either the vaccination registers or the CEBs. The term shoemaker was used as a generic term to describe those who worked on their own, or were employed within a factory setting as managers or labourers. Alternatively occupation was described by the specific work undertaken, such as 'finisher', 'clicker' or 'riveter'. As a result social status for this large group of shoemakers could not be clearly identified from the information available. The impact of the type of occupation on infant mortality was therefore explored using three categories; shoemakers, agricultural workers and 'other occupations'.
The percentage of families engaged in shoemaking varied throughout the sub-district with 55% living in Rushden, 35% in Higham and Irthlingborough, and 10% in the villages. In Rushden, the shoemakers accounted for 78% of all heads of families whereas in Higham and Irthlingborough the number of shoemaking families was less at 62% of the total and in the villages only 31%.

There was little variation in infant mortality among the occupation groups within the sub-district with 22% of shoemaking families, 22% of agricultural families and 20 % of families whose head worked in other occupations, having an infant die before its first birthday. The number of deaths experienced within each occupational group varied

[11] Of the 1598 families found in the 1891 CEBs 38 families headed by a mother were not included.

slightly, with shoemakers having the highest rate of infant death at 114 deaths per 1000 live births, agricultural workers 103:1000 and the group of other occupations 101:1000 (Figure 9:8).

Figure 9:8 *Comparison of IMR, P-NMR and NMR according to occupation in Higham Ferrers from 1880 – 1889*



Source CVRs and 1881 & 1891 CEBs

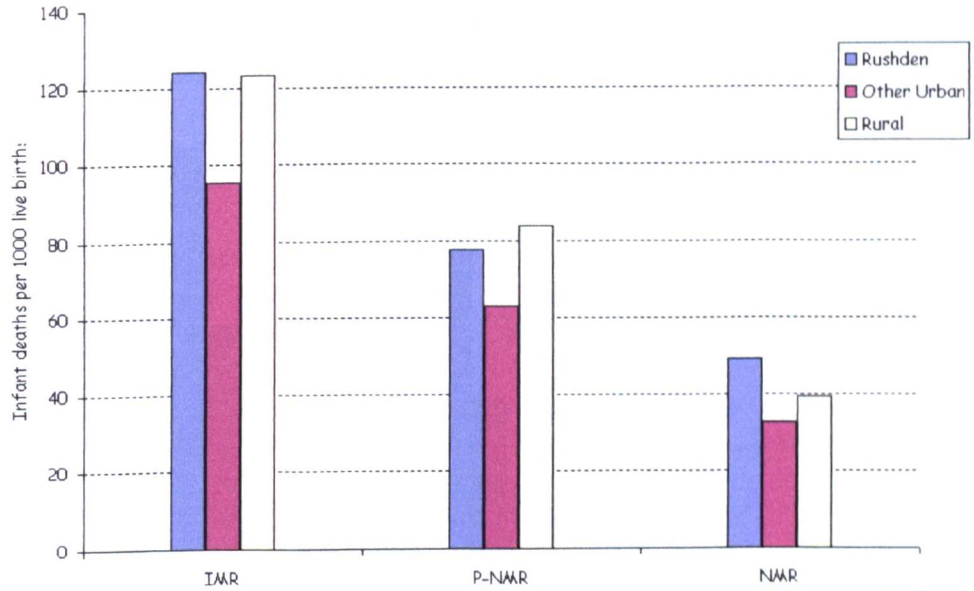
Within the 'other' group the chance of survival for infants of butchers was poor with an IMR of 162:1000 (37 births and 6 deaths). All the butchers lived in the urban parishes and as most kept and slaughtered their own animals, it may be that the area surrounding the home was unsanitary and unhealthy, potentially increasing the risk of diarrhoea (Morgan 2003).

Unlike overall IMR the neonatal mortality (41:1000) was seen to be significantly higher for infants of shoemakers ($p=<0.05$) (Figure 9:8). This compared with 32:1000 for infants born into agricultural workers families and 25:1000 for other families. If however the infants of shoemakers survived the first month their chance of survival was in the same range as infants in the other two occupational groups (shoemakers – 73:1000, agricultural labourers - 71:1000, other occupations 76:1000) (Figure 9:8).

Of the shoemaking families in Rushden, 24% experienced infant death, compared to 20% of such families in the villages and 18% in Higham and Irthlingborough. Interestingly, a comparison of the rate of post-neonatal infant death for infants born to shoemakers living in the towns with those in the villages indicated that the IMR for town born children was lower at 113:1000 than for those born in the rural parishes at 123:1000 (Figure 9:9).

There seems little to account for this difference, which contrasts with the findings that rural infants overall had a lower rate of mortality than their urban counterparts but it may be that the higher neonatal mortality in the towns removed the weaker infants (Figure 6.6). The difference was not however statistically significant, unlike that between those infants born in Rushden and those born in Higham and Irthlingborough which was statistically significant ($p=<0.05$) with IMRs of 125:1000 and 96:1000 respectively (Figure 9:9)

Figure 9:9 *Comparisons of IMR, P-NMR and NMR for shoemakers by place of birth of infants born in Higham Ferrers from 1880 – 1889*

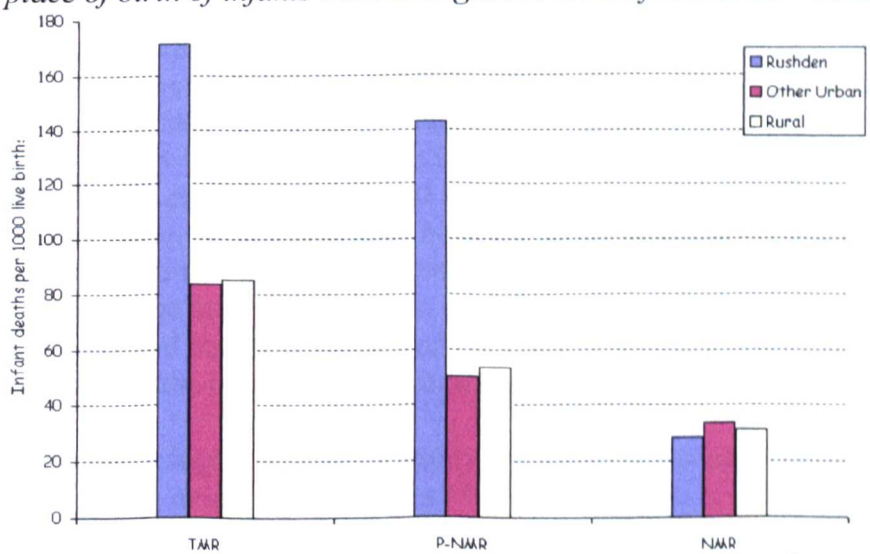


Source: CVRs and 1881 &1891 CEBs

When NMR was considered, the highest rates for legitimate infants born to shoemakers occurred in Rushden with an NMR of 47:1000 against 33:1000 in the other towns and 39:1000 in the rural parishes. There is little to account for the difference between Rushden and the other towns of Higham and Irthlingborough, but due to their numbers, the infants of shoemakers set the pattern of NMR seen in the sub-district (Figure 6.6).

The distribution of infant deaths among agricultural families within the sub-district was very different from shoemakers, with infants born to Rushden agricultural workers experiencing a significantly higher post neonatal mortality rate of 143:1000 (p=<0.01) and an IMR of 174:1000 than in the rural parishes or in Higham and Irthlingborough (Figure 9:10).

Figure 9:10 *Comparisons of IMR, P-NMR and NMR for infants of agricultural workers by place of birth of infants born in Higham Ferrers from 1880 – 1889*

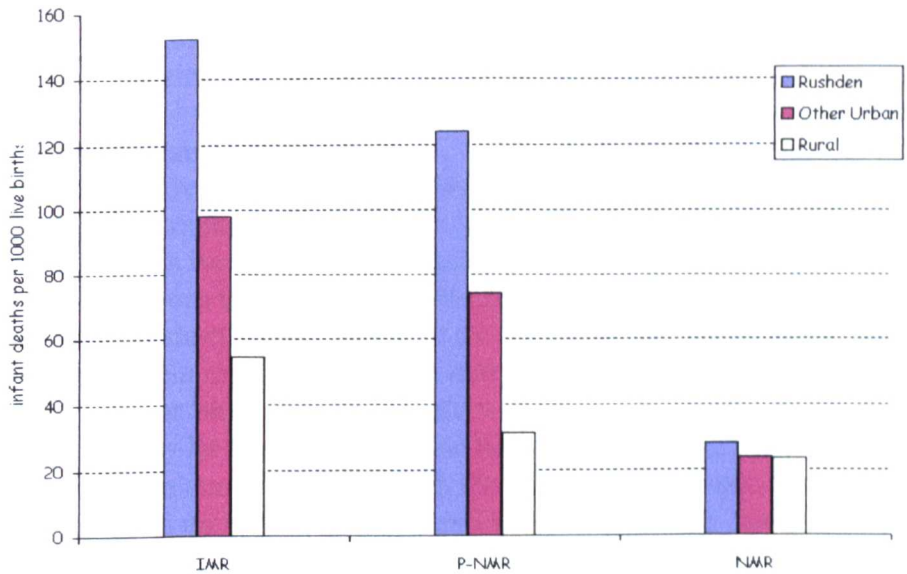


Source: CVRs and 1881 &1891 CEBs

For infants born to fathers in other occupational groups the penalty for the post-neonatal infant of being born in Rushden was again clearly identifiable with the difference in

mortality between them and those infants born in rural parishes being highly statistically significant (p= <0.001) (Figure 9:11).

Figure 9:11 *Comparisons of IMR, P-NMR and NMR for infants of men working in occupations other than shoemaking and agriculture, by place of birth from 1880 to 1889*



Source: CVRs and 1881 & 1891 CEBs

Although the situation for Rushden neonates born to fathers in occupations other than shoemaking and agriculture was marginally worse than for infants born in other locations within the sub-district the results were not significant (Figure 9:11).

In conclusion, the difference in mortality rates varied markedly across the sub-district, with all infants born in rural areas and in Higham and Irthlingborough being less likely to die whatever their fathers' occupation, than those born in Rushden. In Rushden the rates of infant death were comparatively low for the infants of shoemakers who survived the first month, but especially high for the infants of agricultural workers indicating a detrimental exogenous influence was present within these families. The mortality rates for rural infants born to shoemakers were seen to be unusually high and higher than for those born to fathers in other occupations and higher than those seen in Higham and Irthlingborough. This was potentially an attribute of the small numbers involved but as seen earlier the results were statistically significant and therefore indicative of features of shoemaking in the rural parishes that lessened the infants' chances of survival. It is difficult to account for this disparity in rates, as it is not known if there were differences in the way in which shoes were made, or in the lifestyles of shoemakers in the various parishes to explain this phenomenon. Wages may have been higher in Rushden for those men employed in factories and there may have been a greater opportunity for women to work within the home as shoe outworkers than in the villages, but whilst this may explain the improved post-neonatal mortality compared with other occupations within the town it does not account for the higher neonatal mortality rates.

Abnormally high perinatal mortality rates amongst women in the Leicestershire shoemaking industry in the years 1976-82 have been recorded by Clarke and Mason (1985). A similar situation was also found in Montreal, Canada (McDonald and McDonald 1986). Both studies concluded that there may have been a feto-toxic agent in either the glue used in closing, or in the leather itself leading to foetal or early neonatal death. Millward & Bell (2001) also indicate in their study that whilst the IMR for Northampton

town between 1907 and 1910 was relatively low at 109:1000, the neonatal mortality rate was higher than average at 42.3:1000. Similarly Graham (1994) found that there were strong links between shoemaking, women's employment and prematurity in his study of Northampton between 1911 and 1931. Since shoemaking is the common factor in the studies of Northampton, those of Clarke & Mason in Leicester and McDonald and McDonald in Montreal, it is possible that these findings also relate to the situation in Higham Ferrers, providing a plausible explanation for the relatively high rate of neonatal mortality during the 1880s.

9:7 Single parent families

One of the advantages of being able to use the vaccination registers in combination with the CEBs, was that it was possible to identify the range of different circumstances into which infants were born. The majority were born into families headed by a father, but some were born to single unmarried mothers, others were born to widows, or to those who got married shortly after the birth, or to mothers who appeared to be in a stable but unmarried relationship. When the mother was identified as a widow at the next census point after the birth of an infant and was cited in the CVRs as the parent (instead of the father) it may be that the infant was born posthumously to her husband, or may have resulted from another relationship. However the end result was potentially the same as for those born to unmarried mothers and in this section the chances of survival for infants, born into 'less conventional' family units will be explored. For the purpose of this study all such infants have been described as 'illegitimate'.

Illegitimacy has been shown by many to be detrimental to the infant and to result in high levels of infant mortality (Wrigley et al 1997; Reid 2001; Smith 2003).When the mother was young and previously unmarried, particularly if she was living away from her parental home, then the chance of survival of any infant born to her was likely to be poor. Wrigley et al (1997) suggest from their data, that the illegitimacy infant mortality rate was twice as high as among legitimate births. Their findings were based on several sources including the Registrar General's 38th Annual Report. Rates varied across the Registration districts, but the difference between legitimate and illegitimate infant mortality rates remained constant. Between 1906 and 1910 the infant mortality rates were said to be 224:1000 for illegitimate births compared to 113:1000 for those born legitimately (Glass cited in Wrigley 1997). Reid (2005) indicates that the percentage of illegitimate births decreased from 7% in 1837 when civil registration was first introduced, to 4% by the first decade of the 20th century.

In Higham Ferrers there were 121 families - 5.4% of the total with 150 infants who could be described as illegitimate and accounted for 3.3% of all births. This was lower than the 5.8% on Skye and 4.9% in Ipswich during the 1880s, found by Garrett and Davies (2003) in their comparative study. Only 41 (35%) of these families were found in the 1891 census – 39 within the sub-district and 3 in surrounding towns. This compared with 74 % of conjugal family units and had implications for making comparisons because only a small percentage of illegitimate infants were observed to their first birthday, unlike those born legitimately. Where the infant died the opportunity to observe the mother in 1891 was very limited because she was not easily recognised in the census data if she married before the census date. There were 22 illegitimate children in the 1891 census observed to be living with grandparents or other relatives rather than their mothers.

The rate of infant mortality in Higham Ferrers for all illegitimate infants was high at 233:1000 compared with 116:1000 for all legitimate infants: a difference in rate similar to that found by Wrigley et al (1997). The difference, despite the small numbers of illegitimate infants involved (35), was highly statistically significant ($p=<0.001$). If only

those whose experience to first birthday (106) within the sub-district were analysed then the rate was seen to be even higher at 330:1000, similar to the findings of Woods (1996), who indicated that a third of all illegitimate infants died in Britain during the late 19th century. When the infant mortality experience of the single parent families was compared with that of more traditional family units, the difference was again found to be statistically significant ($p<0.001$). Of the 121 families, 29% experienced the death of an infant compared with 11% of legitimate families.

The majority of the 121 families (65%) of illegitimate infants were found in the towns – 44 (36%) in Rushden and 35 (29%) in Higham and Irthlingborough. The remaining 42 (35%) families were found in the rural parishes, a figure possibly influenced by a number of young mothers returning home from the towns for the birth of the baby (Blaikie et al 2005). This is supported in the Higham Ferrers data with 45% of mothers in the rural parishes found to have been born in the same parish as their infants compared to 25 % in Rushden.

The urban mortality effect was also clearly demonstrated with 34% of single parent families in Rushden experiencing infant death compared to only 21% in the villages. Whilst 21% was still high compared to the legitimate family experience of infant death, it may reflect the greater support available to unmarried mothers within the parental home in the villages, whereas the mothers in Rushden may have moved there for work and may have lacked kinship networks. Of the infants born in the rural parishes, whose mothers were not present in 1891, 20% were living with their grandparents compared to only 9% in Rushden.

The age of 90 of the mothers was known at the time of the infants' birth, but for the transient infants and those who were left behind with grandparents, there were no further details apart from the mother's name identifying them as illegitimate. Where the mother's age could be determined, there were 34 (23%) born whilst their mother was still a teenager, a further 36 (40%) whose mother was in her 20s at the time of birth, 17 with mothers in their 30s (19%) and 3 whose mothers were 40+. These last mothers were Sarah Neville, Eliza Bailey and Elizabeth Dickens. Sarah and Eliza were listed as widows in the 1891 CEBs and Elizabeth had married and left the sub-district by 1891. The infant mortality rate for those born to teenage mothers at 250:1000 was higher than for mothers in other age groups. The mothers who were in their 40s at the time of birth of their infants appeared to be better able to cope and their infants all survived.

The majority of the mothers had a single child (95), but there were 20 mothers who had 2 illegitimate children, 3 who had 3 illegitimate children and 1 - Louisa Hill - who had four. Louisa had given birth to 3 legitimate children before 1881 but at the time of the 1881 census was described as a widow. During the 1880s she gave birth to 4 more children born illegitimately, possibly fathered by her lodger whom she subsequently married. Her children all survived and it may be that although they were born illegitimately they were reared in a stable environment with both parents present. The only set of twins was that born to a teenager, Mary Ann Knight, and both died on the day of birth.

Illegitimacy appeared more common in some families than in others and it was not unusual to find sisters producing illegitimate infants. For example Emmagene George and Sarah Ann George each had two illegitimate children. Their mother was also unmarried. There were also two other mothers of illegitimate infants who lived in Irchester and were called George at the time of their infants birth and may have been relatives of Sarah and Emmagene. There were 12 other sets of mothers who had the same surname and whose

babies were born in the same place indicating that they may have been related, but apart from Hannah and Naomi Robinson and Sarah and Anne Whitehead, there is no other evidence to support this assumption.

There were 57 infants born to mothers who listed their occupation at the time of birth as shoe workers, 9 were identified as servants and 43 for whom no occupation was listed.[12] There was also a group of other occupations such as lace making or dressmaking in which the mothers of 41 infants were employed. A third of all infants of infants born to shoe worker mothers died compared with 27% of the workers in other occupations. Those mothers who were not employed experienced infant death the least – 7%. Whilst employment in the shoe industry may have been an influencing factor in infant death, it is also probable that those mothers who were listed as employed had no other means of support. In contrast the group of mothers who were unemployed may have been living at home with their parents or in a stable relationship. If so, this is indicative of the importance that support for the mother plays in infant survival.

As shown in many other studies, the infant born into a Higham Ferrers family headed by a mother, rather than father, was less likely to survive. In addition being born in Rushden to a mother who worked in the shoe industry further decreased the likelihood of survival to 1st birthday. Those born in the rural parishes were less likely to have working mothers and more likely to have enjoyed the support of grandparents and other family members which seems to have proved a positive factor in infant survival. This may have contributed to the lower rates of infant mortality in these parishes seen in Chapter 6 and conversely to the higher rates seen in Rushden.

9:8 Multi-infant deaths in families

A variety of factors have been explored so far in this chapter to identify commonalties amongst families experiencing the death of an infant. As found by Edvinsson et al (2005), the vast majority of families saw their infants survive to first birthday but there were some families which could be described as high risk for infant death. Shoemakers infants were seen to be vulnerable during the first month whilst those born into urban agricultural families were at high risk during the post-neonatal period. Families headed by a mother, those with multiple births and large families were all found to be vulnerable. Nonetheless none of these factors alone could be said to be responsible and, with the exception of multiple births, the percentage of families *not* experiencing infant death was greater.

There were 6 families within the sub-district that experienced the death of 4 or more infants. All were shoemaker families apart from Frederick Percival who was an ironstone worker from Irchester one of the rural parishes. There was one set of triplets among the group but no twin sets, the children were all legitimate and their families remained in the sub-district until the 1891 census. Only one of the families, that of Henry Webb, did not have other children who survived infancy. Henry's children died aged 79 days, 29 days and the last two on the day of birth indicating that the cause of death may well have been inherited factors. Similarly three of Rowland Shorley's infants died in the first month but the first survived to 233 days. The mothers with the exception of Martha Ingram and Beatrice Webb were both in their 20s at the time of the birth of their infants. Martha was 30 and Beatrice was 19 at the time of the birth of her first infant. Beatrice was herself born in Rushden and therefore presumable had kin to support her.

[12] Some mothers changed their occupations between the births of one infant and the next and therefore mothers may appear in this list more than once

Each of the families demonstrates one or more of the criteria thought to influence infant survival but as Edvinsson (2005) indicates for high risk families, it may not only the clustering of deaths within families, but the type of family that matters. The families with one exception lived in Rushden and therefore potentially contributed to the urban effect found in the sub-district but if these families are removed the difference in mortality rate between Rushden and the other parishes remains statistically significant ($p=<0.01$). When the families with 3 infant deaths are also removed, (6 of whom lived in Rushden) the same results are found ($p=<0.01$). It would seem therefore that whilst clustering of deaths did occur in families in Rushden this did not cause the urban effect, which remained even after the families were removed from the analysis. Instead living in Rushden may have contributed to the high rate of infant mortality in these families. In the next chapter the factors influencing the urban effect in Rushden will be summarised.

Chapter 10. Rushden, Shoemaking and Infant Mortality

Thomas (1883) the Medical Officer of Health for the Higham Ferrers sub-district during the 1880s, attributed the high rates of infant death in the sub-district to the conditions resulting from the industrialisation of shoemaking. The social and physical character of Rushden had altered irrevocably with the development of shoemaking in the town resulting in increased employment opportunities and rapid population growth from in-migration. In confirmation of Thomas's comments, the infant mortality rate for Rushden was found in this study to be significantly higher than elsewhere in the sub-district. The stark figures were found however to mask a complex set of variations in mortality experience between and within groups of infants born in the sub-district in the 1880s. This chapter aims to review the findings of the study and to formulate an overview of the factors influencing the pattern of infant mortality observed in Higham Ferrers, with particular reference to Rushden.

10:1 Infant Mortality patterns

Various factors have been highlighted in this study as being instrumental in producing the pattern of infant death in Higham Ferrers. Some of these were also responsible for the differences seen in the infant experience between Rushden and the other parishes. The impact of industrialisation and population growth on the infants born in the sub-district was demonstrated in the pattern of infant mortality, with rates above 150 per 1000 during the period of proto-industrialisation of the industry in the early 1870s (Figure 6:3). During the 1880s the IMR initially declined and then remained static, at a time when the population growth was in the order of 40 per cent, factory production had become more established and mechanisms such as a house building programme had been put in place to manage the influx of people to the area. Infant mortality rates rose slightly in the last 4 years of the 1890s, followed by a precipitate decline concomitant with a decline in shoemaking and in-migration (Figure 4:5). This pattern contrasted with that of Northamptonshire and the Wellingborough Registration District where industrialisation took place earlier in the 19th century and where the rate of infant mortality started to decline from the early 1880s and continued to do so without interruption (Figure 4:6).

The pattern of mortality was characterised by short term peaks and troughs in rate; a pattern in keeping with one derived from the influence of infectious epidemics. The underpinning factors responsible for the peak in rate at the end of the 19th century in the sub-district pattern contrasted with that reported in more industrialised towns. The increase in infant deaths was seen to result from an increase in neonatal deaths in Rushden and winter deaths of older infants in the rural parishes of the sub-district (Figures 5:7 & 5:8). From the beginning of the 20th century the peaks reduced in size and the overall rate for the sub-district declined rapidly.

During the years 1880 to 1889 the overall pattern of cohort infant and neonatal mortality was one of a rising trend with short term peaks in 1884 and 1889 (Figure 6:5). Although the pattern of cohort post-neonatal and neonatal mortality exhibited similarities with short term peaks in mortality rate, the years in which these occurred differed (Figure 6:8). The trend in rate for post-neonatal mortality was static over the 1880s whereas that for neonatal mortality rose steeply, indicating increasingly adverse conditions for the neonate.

10:2 Industrialisation and population growth

Despite the massive increase of 103% in population in Rushden during the 1880s, the overall size of the town remained small compared to the manufacturing towns and

cities where rates of infant mortality were high (Table 4:2). There was however a marked difference in patterns of infant mortality between Rushden, which underwent urbanisation and population growth during the last three decades of the 19th century, and the other parishes of Higham Ferrers where the impact of industrialisation was less apparent (Figure 5:4).

Although the highest rates of infant mortality in the sub-district were seen in Rushden, from 1900 the town also experienced the steepest decline in IMR so that by 1904/1905 the rate of infant death was lower than that in the rural parishes where the decline in rate was slower. The trend-line for Higham and Irthlingborough crossed that of the rural parishes even earlier in 1894/1895 (Figure 5:4). Nonetheless the infant experience in the rural parishes was presumably so much better initially than that for the urban infant that the improvements were likely to be less marked.

Neonatal mortality in Rushden was approximately 40:1000 and declined little over the period from 1880 – 1910, in contrast to the rural parishes where NMR declined rapidly between these dates (Figure 5:10). The decline in these villages was in part attributable to the cohort of 1887 who were exceptionally healthy with an IMR of 22:1000 and no neonatal deaths among the 91 babies born during the year. During the 1880s however the overall neonatal mortality rate rose throughout the sub-district (Figure 6:10).

Post-neonatal mortality patterns also differed within the parishes especially during the 1880s, with that in Rushden rising more steeply than in any of the other parishes and with the difference in rate being statistically significant.

There seems little doubt that the higher rates of infant mortality, especially post-neonatal mortality, in Rushden arose as a consequence of rapid population growth which overwhelmed local resources. In-migration increased the disease pool and the resultant overcrowding facilitated the spread of infectious epidemics, especially of airborne transmitted diseases. Measles, whooping cough and scarlet fever were common throughout the years studied and, although the evidence is circumstantial, the role of infections in infant death is demonstrated well in the pattern of infant mortality which was one of short term peaks and troughs in rate. The years when the highest rates of infant mortality were found in Rushden were all years when the MOH for the sub-district reported epidemics. Similarly in the year when rural rates of infant mortality exceeded those of the towns, there was a widespread measles epidemic (Tables 7:2 & 5:3).

Decline in the incidence of mortality at all ages from infectious epidemics in the sub-district was coincident with a decline in infant mortality and in particular in the peaks and troughs in IMR, adding further weight to the argument that infections were a cause of excess infant mortality within the sub-district and especially in Rushden. By the end of the 19th century the reports of death from infectious diseases were rare but the reason for the decline in the incidence of infectious epidemic deaths has not been identified so far. It could be that epidemics no longer occurred but this is unlikely as the evidence from the Rushden Minute Books of the Urban District Council from 1892 until 1910 describe an ongoing battle to contain epidemics and limit the spread of measles and whooping cough (Chapter 7).

Since morbidity did not decrease, the reduction in deaths must have resulted from other factors such as a reduction in virulence of the causative organisms, advances in medicine or, as McKeown (1979) hypothesised, an increase in resistance of the host to infection as a result of improved nutrition. In support of McKeown's view that nutrition was a vital factor in improving resistance to infection, there is little doubt that the boom in

shoemaking during the 1880s would have ensured that the nutritional status of the population improved throughout the sub-district. However the decline in infant mortality in the sub-district was concomitant with a decline in shoemaking, strikes for better pay and conditions and widespread unemployment (Figure 4:13).

Medical intervention was dismissed by McKeown (1979) as the reason for the decline in mortality from infectious diseases because the causative agents were not recognised until after the general decline and it was as late as 1930 before any treatment and/ or immunisation was available. McKeown however omits to mention the role played by the medical profession in other ways, not least the public health measures that were taken by the MOHs (Szreter 1988). The need for maternal education was a key strategy of men like Newman and Newsholme in the first decades of the 20th century and there is clear evidence from the MOH reports and the RUDC minute books that this was carried out enthusiastically, although possibly ineffectively, in the sub-district. Thomas the MOH for Higham Ferrers appeared typical of the medical men of the age as he constantly promoted the need for a cleaner environment and a healthier style of living. The first Health Visitor was not appointed in the sub-district until 1908 but evidence from Agnes Hunt (1938) indicates that fever nurses were used in time of epidemics. After the 1898 Vaccination Act public vaccinators were required to visit infants in their own homes and it is considered highly probable that as part of the process to assess the infant's health, advice would also have been given about general health measures.

Whatever the cause of the decline in deaths from infectious diseases, there is little doubt that infection had been a major factor in infant death in the sub-district, especially in Rushden and may have contributed to the halt in the decline of IMR which was seen elsewhere in Northamptonshire from the 1880s.

Unusually for an urban setting during the late 19th century, the incidence of epidemic summer diarrhoea, the curse of the factory towns, does not appear to have been a problem in Rushden despite population growth, increasing population density, the lack of a clean water supply and inadequate removal of waste - key features in the transmission of diarrhoeal infections. Although it appears from MOH reports that initially the infrastructure of Rushden was unable to cope with the influx of migrants and that in addition sanitary arrangements were especially poor, the situation rapidly changed. Model byelaws for house-building were introduced in the late 1880s and sanitation was much improved and although there was no clean piped water to the town until 1906, the incidence of waterborne diseases declined. Epidemic diarrhoea was mentioned only in 1898 in relation to the sub-district and then there were only 7 reported cases – not necessarily of infants. The reason for the lack of diarrhoea in Rushden during the 1880s was unclear, but as the majority of mothers who worked did so in their own home or nearby, they would have been able to breastfeed their infants, thus limiting the risks of contamination.

From the information gained from the CVRs it was found that there was a preponderance of infant deaths in the winter months especially during those of the first quarter (Figure 7:1). Whilst this may have resulted from respiratory infections due to overcrowding, the percentage of first quarter deaths was similar in Rushden and in the other parishes including the smallest of the villages and could not therefore be attributed to any particular place or occupational group. Over a third of all infant deaths during the 1880s occurred between January and March, although births were evenly spread throughout the year (Figure7:1). Munro (1994) has suggested that damp wet clay soil may have been a factor in winter infant deaths but although some of the parishes were located on wet clay soil not all

were (Figure 2:5). Winter deaths were nonetheless a distinct feature of the infant experience in Higham Ferrers, and as seen in Figure 4:15, more so than in the other sub-districts of the Wellingborough District.

Whilst there would seem little doubt that the industrialisation of shoemaking impinged on the health and welfare of infants born in the sub-district through its effect on the environment, it did not provide sufficient explanation for the high rate of neonatal mortality found especially in Rushden. Infections may have accounted for some deaths but the underlying rate was high and rose through the period studied; in contrast to post-neonatal mortality which declined with the decrease in deaths from infections.

10:3 Rushden infants and their families

A strength of this study has been the ability to be able to locate the infants within their families as well as the community in which they were born. This highlighted a variety of complex inter-connected factors evident in Rushden families that may have contributed to the higher rates of infant and neonatal mortality seen in the town.

Over 50 per cent of illegitimate infants born in the sub-district during the 1880s were born in Rushden and experienced an infant mortality rate of 286:1000. This compared with 202:1000 overall for the other parishes but the difference was not found to be statistically significant unlike that for legitimate infants ($p=<0.01$). Similar results were found for illegitimate neonatal mortality but the numbers involved were very small. When illegitimacy was controlled for, the difference in both IMR and NMR remained, indicating that illegitimacy *per se* was not responsible for the difference in rates between Rushden and the other parishes. Similarly it would seem that illegitimate infants were subject to similar influences and therefore that industrialisation and the urban environment were not the main factors in determining the life chances of the illegitimate infant born within the sub-district unless their mothers were employed in shoemaking (Chapter 9:8).

In addition to those infants born to single mothers within the sub-district during the 1880s, the experience of twins was also found to be exceptionally poor with an IMR of 595:1000 and an overall NMR of 405:1000 (Table 8:5). These results were in keeping with those of Reid (2001), who found that the life chances of infants born as a result of multiple births were 6 to 8 times worse than for the singleton. The rates for Rushden born twins were slightly worse at 605:1000 than for their rural counterparts at 583:1000, but the difference was not found to be statistically significant indicating that as with illegitimacy, urban living in itself was not a factor in the high death rates of those born in twin sets.
To some extent the social and economic influences on the infant were dictated by the occupation of the head of the household. Garrett et al (2001) suggested that the greatest impact of wealth and income was in allowing a choice of where to live. Whilst shoemaking provided both men and women with opportunities for work, the industrialisation of the shoemaking process also meant that shoeworkers had to move to the towns to be near their work (Morrison & Bond 2004). The infants of shoemakers born in Rushden appeared to experience the penalty of urban living in common with all infants, but when age at death was explored, the pattern of infant mortality was different from that of infants of non shoemakers. The higher rate of mortality experienced by infants born into shoemaking families was mainly the result of high neonatal mortality (Figure 9:8). The mortality rate for shoemakers' infants who survived the first month was slightly lower in Rushden than in the rural parishes, but still higher than infants born in the other towns of Higham and Irthlingborough (Figure 9:9). The P-NMR for shoemakers' infants was significantly better than that for the infants whose fathers in other occupations ($p=<0.01$). This may have been the result of an improved income or because childcare was provided by the mother who

worked in her own home. During the first month however the infants of shoemakers wherever they were born fared worse than the infants of non-shoemakers (NMR 51:1000 compared with 30:1000 for non shoemakers). Even when factors known to influence the first month experience such as multiple births, maternal age or short birth intervals were excluded the neonatal mortality rates of shoemakers' infants remained significantly higher. As research in twentieth century Leicester and Canada indicated the presence of feto-toxins in the leather or in the glue used in the closing process, which were potentially harmful to the developing foetus causing stillbirth, miscarriage or neonatal death, may have had a part to play (Clark & Mason 1985; McDonald & McDonald 1986). If mothers worked as closers whilst pregnant (a distinct possibility since they could work in their own homes and in their own time) then this may be a factor in high neonatal rates among shoemaker's infants. At all maternal ages the NMR was higher for shoemakers' infants in the 1st month compared with non shoemaking heads of household, especially amongst the youngest group of mothers. There were a greater percentage of young mothers in Rushden who were potentially the group most in need of extra money. If shoemaking was a contributory factor in neonatal mortality, then this may account for the high rate of NMR in this age group - especially in Rushden. For women to be able to work at closing they needed to live near to a factory from which they could buy the necessary shoe parts and then be able to sell them again when they were completed or 'closed' for finishing. Those women living in Rushden would have had an advantage over women in the other parishes, where there were fewer if any factories. Rural women were more likely to be employed in lace making, dress making, domestic service or agriculture.

Many of the mothers of illegitimate children born in Rushden during the decade who were working at the time of notification of their infants birth, were doing so within the shoe industry and if they are discounted the rate of NMR for Rushden shoemakers infants remains similar (47:1000). In contrast the NMR in the villages decreases to 34:1000 for shoemakers' infants when mothers working in the shoe industry are removed from the data. In the villages illegitimacy therefore appears to have been a factor in the high rates of shoemakers' infant mortality. The numbers involved were however very small but the life chances of neonates born into shoemaking families was seen to be significantly less than that for infants whose mothers worked in other occupations or were not employed.

In contrast to shoemakers, the neonatal mortality rates for infants born to non-shoemakers in Rushden during the 1880s were good, but the life chances for those who survived the first month were significantly worse than for the infants born to shoemakers. Post-neonatal mortality rates for infants of agricultural workers in Rushden were exceptionally poor and the difference between these and the rates for infants born outside Rushden to men in similar occupations were highly statistically significant Figures 9:10 & 9:11). The risk of diarrhoea was potentially greater for infants born to urban farmers than to others because the home environment was more likely to be contaminated by animal dung and flies. The percentage of deaths in the summer quarter, however, was lower than that in the 4th quarter indicating that whilst diarrhoea may have been a factor, if it occurred it did so in the winter months.

Two other factors were found to contribute to the higher rates of infant death seen among Rushden infants; short birth intervals and being male. Short birth intervals were found to profoundly influence neonatal mortality with 41% of infants dying who were born after an interval of less than 12 months and 57% of infants preceding the interval also dying (Figure 9:7). The majority of mothers who had infants in rapid succession also lived in Rushden thereby impacting adversely on infant mortality rates within the town, especially of neonates.

The life chances of male infants were less than those for female infants across the sub-district but for males born in Rushden (159:1000) during the 1880s, the chance of dying before their first birthday was significantly greater than for males born in the other towns and villages (118:1000). There is little to explain this phenomenon which was as true for neonates (50:1000) as for those who survived the first month (115:1000). The percentage of male infants was no greater in Rushden than elsewhere and when illegitimacy and twin births were controlled for the results remained significant.

Similar results were found for the sons of agricultural workers born in Rushden for whom the chance of surviving the first year was significantly worse than for those born elsewhere in the sub-district. However the same was not true for daughters, for whom the rate of infant mortality was as low in Rushden as in the other parishes of the sub-district. There seems to be no explanation for this phenomenon since environmental factors were presumably similar for both sexes. In contrast the difference in mortality for the male infants born to shoeworkers was not significant indicating that the life chances of shoemakers' sons were similar throughout the sub-district. In the villages the chance of survival for the sons of shoemakers was exceptionally poor with 32 of 129 infants dying even when other factors such as legitimacy and twins were controlled for. The pattern of mortality for the daughters of shoeworkers throughout the sub-district was similar to that of sons indicating that shoemaking was the factor responsible for the high infant death rate.

Conclusion

This study has found that for all groups of infants (socio-economic, gender, legitimate etc) born in Rushden during the period from 1880 to 1889 the likelihood of death during the first year was greater than for their rural counterparts. For some groups the difference in mortality rates was marked whilst for others it was less so. For example the infant mortality rates were significantly higher for the sons of agricultural workers born in Rushden than for those in the other parishes. In other situations the influencing factor was all pervasive, with infants born anywhere in the sub-district at risk (albeit slightly lower outside Rushden), such as those born in twins pairs or born to single mothers. Wherever and whenever infants were born in the sub-district the risk of death was highest in the winter months. At different ages the chance of survival was also seen to favour those not born in Rushden, with neonatal mortality rates lowest in the villages. For the sons and daughters of shoemakers however the chances of dying were greatest during the first month wherever they were born. This was in contrast to the infants of all other occupational groups and the difference in NMR between shoemakers and non-shoemakers was found to be statistically significant.

The situation was however far from straight-forward and the number of infants who survived was great. Only for twins born during the 1880s in the sub-district was the risk of dying higher than the chance of survival. This being the case none of the influencing factors alone could be said to be responsible for an individual infant's death; instead a complex collection of circumstances increased the risk of the infant dying.

The family of Frederick Ingram encapsulates the findings of the study and demonstrates the complexities found when researching infant mortality at the lowest possible level: that of the individual infant. Frederick, a shoemaker, and his wife Martha had 10 children in 13 years born in Rushden; five of whom died in infancy: a sixth was missing by the time of the 1891 census and may have died in childhood. Two died during the neonatal period (one at 1 day, the second at 13 days), the others at 6 to 7 months; perhaps when weaned. The deaths at seven months also occurred during periods of epidemic infections and this too may have been a factor. The two neonatal deaths were both sons. Martha was 41 when she

had her last child. The birth intervals were very short with two infants born less than one year apart both of whom died: Ernest opening the interval at 13 days and Lillian closing the interval at 222 days. Martha was listed in both the 1881 and the 1891 CEBs as being unemployed but it is likely that she worked as a closer within the home and may therefore have breastfed her infants. The family also had three lodgers listed in the 1881 census increasing the potential for overcrowding and the disease pool, but also supplementing Frederick's income. For this family, the numerous influences impacting on the life chances of their infants, illustrates well the complexity of the issues surrounding infant mortality and the importance of being able to locate infants not only in their communities but within their families.

In part therefore this study has confirmed Thomas' view in 1883 that the conditions in Rushden as a result of the industrialisation of shoemaking were responsible for the high infant mortality rates found, but many questions have been raised in relation to the complexity of factors influencing the infant experience. In the concluding chapter the contribution of these findings to the wider debate of the impact of urban living on the infant experience and the decline in infant mortality in the early years of the 20th century will be explored.

Chapter 11. Discussion of Findings

The aim of this study has been to determine the impact, if any, of the industrialisation of shoemaking and the consequent urbanisation of Rushden on the experience of infants born during the period 1879 – 1910 in the Higham Ferrers sub-district of Northamptonshire. So far the results have been discussed in this local context, but in this concluding chapter their contribution to the wider debate, especially that related to the urban effect on infant mortality, will be reviewed.

A number of researchers have pointed to the need for local studies to finesse the conclusions of larger scale studies using data aggregated at sub-district or district level (e.g. Garrett & Reid 1995; Williams & Galley 1995) and this study has been conducted at the lowest level possible; that of the individual infant. Exploration of individual-level data allows for the '*story*' behind the statistics to be uncovered and to demonstrate the extent of the variations that make up the national, county, district or, as in this case, sub-district patterns of infant mortality.

The central data source was the hitherto largely unused smallpox vaccination birth and infant death registers that were available for Higham Ferrers from 1879 to 1910. This information combined with that from the CEBs for 1881 and 1891, the Medical Officer of Health reports and local government minutes of council meetings, provided a rich source of social and biographical information and permitted a rare opportunity to locate the infants within their individual families. Although the number of infants involved did not permit the use of a wide range of statistical tests, the Chi-square test of statistical significance provided a means of confirming that the results were sound.

As discussed in Chapter 3, the smallpox vaccination birth registers and infant death registers were instituted following the 1871 Vaccination Act. Those used in this study are originals and were produced at the time as working documents. This adds to their value and to their accuracy, since records were revisited whenever further details needed to be added. The registers are not without faults and if the source is to provide reliable data for the calculation of infant mortality rates, then the importance of having both the vaccination birth registers and the infant death registers available cannot be underestimated. The registers do not give cause of death, a particular problem for this study, as the information was not available through any other source as the cost of obtaining numerous death certificates was prohibitive. Nonetheless, the registers provide a much more detailed account of infant mortality than any other readily available source. The inclusion of actual dates of birth and death allowed the study not only of infants in general, but also of specific age groups within the first year of life. The source also provided data that enabled the differences between occupational groups to be distinguished and to locate the experience of the infants studied within their family group thus enabling exploration of the influence of factors such as birth intervals and birth order as well as those such as migrant status.

Higham Ferrers, albeit seemingly unremarkable and previously unresearched with respect to infant mortality, provided an ideal setting to explore the impact on the infant experience of rural industrialisation and the subsequent urbanisation of a large village: Rushden. Other parishes, where the impact of industrialisation was less, were available for comparison and thus for the exploration of the '*urban effect*' in infant mortality. Exploration of the occupational influences on the infant experience (important when reviewing the impact of industrialisation) may not have been considered viable owing to the small numbers

involved, but as 57% of all infants born in the sub-district during the 1880s were born to shoemakers, comparison with the infants of non-shoemakers was considered to be valid. The study was structured in two parts with an in-depth exploration of infants born in the sub-district during the decade from 1880 to 1889 nested within a wider study of the period for which the vaccination registers were available. The 1880s were chosen because for Rushden this was a time of intense activity in the shoe industry and in the development of the town. In addition a complete set of vaccination birth and infant death registers were also available for the decade, which meant that when combined with the 1891 CEBs, 93 per cent of the children born during the 1880s could be observed to their first birthday or to their death; whichever came first.

The pattern of infant mortality found in the sub-district was compared to that presented for the Wellingborough District and for Northamptonshire by the Registrar General and was found to follow the same trajectory. Unlike the district and county pattern, a slight peak in infant deaths in the late 1890s - similar to that seen in the country as a whole, was also observed in the Higham Ferrers pattern.

The urban penalty identified by many authors (Woods et al 1989; Williams & Galley 1995 etc.) was clearly evident in the Higham Ferrers data, especially when infant mortality rates in Rushden were compared with those of the smaller parishes of the sub-district where the impact of the changes in the shoemaking process was less evident. There seems little doubt that the higher rates of infant mortality in Rushden, especially post-neonatal mortality, occurred as a consequence of rapid population growth which overwhelmed local resources. In-migration increased the disease pool and the resultant overcrowding facilitated the spread of infectious epidemics, especially of airborne transmitted diseases. The pattern of infant mortality was one of peaks and troughs in rate, concomitant with reports from the MOHs of epidemics of measles, whooping cough and scarlet fever. As described in 1883 by Thomas, these results were similar to those found in other larger industrial towns of the Midlands and Northern England where the impact of urban living on the infant experience was even more deleterious.

Where the results differed from those of other studies of urban infant mortality, was in the season of infant death and, therefore, its likely cause. Infant death predominantly occurred during the winter months in both the urban and rural locations in Higham Ferrers. This was in contrast to the larger, more industrialised centres, such as those described by Newman (1906), where summer deaths among infants tended to predominate. In the latter settings epidemic diarrhoea was reported to be the influencing factor especially during the long hot dry summers of the years at the end of the 19th century. From MOH reports, however, diarrhoea did not appear to be a significant feature of the infant experience in Rushden, despite the fact that it too was overcrowded, unsanitary, lacked a supply of clean piped water and experienced similar climactic conditions. The absence of diarrhoea in Rushden would seem to be common to the locality, with neighbouring Kettering town, which had a population three times that of Rushden, having one of the lowest recorded rates of infant death from diarrhoea (BPP 1913, xxxii: 246-7). It may be of course that the local MOHs did not report diarrhoea as a cause of death, but the occurrence of winter deaths supports the theory that other factors such as bronchitis or other airborne infections were to blame.

Although this study does not contribute directly to our understanding of the reasons for the secular decline in infant mortality at the end of the 19th century, it does illustrate some of the complexities which have been 'lost' amongst the aggregated data. In Higham Ferrers in 1898 /1899, for example, there was a short-term peak in infant deaths, in common with many urban industrialised centres, but this was found to originate from an increase in

deaths in the rural parishes during the winter months and in Rushden among neonates during the summer. This finding illustrates well the need for local studies to qualify the patterns based on data aggregated at higher levels. It also serves to underline the potential difficulties inherent in generating explanations for infant death based on indirect evidence such as that from mortality patterns. For, as was the case in this example, the short-term peak in infant mortality which appeared to be characteristic of summer diarrhoea, was in fact brought about by a different set of circumstances, not accessible to scrutiny without individual infant and parish level data.

In the rural areas of the Higham Ferrers sub-district the decline was of a smaller magnitude than that seen in the urban areas but was proportionately no less impressive. The climactic conditions experienced by both rural and urban infants were similar and winter deaths common to all, yet the IMR of the rural parishes was significantly lower than in the urban centres of the sub-district and continued to decline. This, despite the fact that improvements in the physical infrastructure were not available to the rural population as early as they had been to those living in the towns. Whilst the overall rural population declined, the mean household size rose in the smallest villages and fewer new houses with improved sanitary facilities were built. Research of rural infant mortality has not been possible using aggregate data from the Registrar General but examination of the influences, as in this study, may be possible using local history sources such as the vaccination registers and may point the way to our understanding of the reasons for the urban effect and the generally lower rates in rural areas. The decline in infant mortality in the sub-district was also accompanied by a reduction in shoe making and in-migration. A more detailed exploration of the years around the turn of the century, which was outside the scope of this present study, may help to reveal what impact this had on the infants born locally.

Although not all of the influences suggested by Newsholme (Table 1.2) were open to scrutiny in this individual level study, its major contribution has been to reveal some of the influences and anomalies impacting on the infant experience, which could not be seen using aggregate data.[1] In particular, the ability to compare and contrast urban and rural parish data, and to consider maternal and occupational information, as well as qualitative information about the environment has enhanced our understanding of four areas of influence on the infant: individual; maternal; family and the environment (Table 11.1).

For the most part the findings were not unexpected; confirming what had already been found in other settings. Where this study differed was in the ability to distinguish the impact of these factors on urban and rural infants, both during the neonatal period and for those who survived the first month (Table 11.1). As indicated by Reid (2001) neonatal mortality has not generally been open to scrutiny, but as the vaccination registers provided actual dates of birth and death this made the study of Higham Ferrers neonates possible. This revealed that the factors influencing the life chances of the neonate and the infant surviving the first month were different, clearly demonstrating the limitations of viewing death in the first year of life as occurring within one indivisible age group (Table 11.1).

Within the sub-district, the neonatal mortality rate across the 1880s was found to be 38: 1000 but, in contrast to post-neonatal mortality, exhibited a rising trend over the decade. As with overall infant mortality the influences contributing to neonatal and post-neonatal

[1] The data was not available for this study to confirm the impact of the following of Newsholme's categories: B) Care of the mother, c) Care of the Child, D) Poverty and E) Housing, on the infant experience although where related information was found in the qualitative data comment has been made in the text.

death varied; with those born in rural areas experiencing a lower risk of dying compared to their urban counterparts. The difference between urban and rural neonates was not however as marked as that for post-neonates which reflected the more pernicious disease environment experienced by post-neonatal infants in Rushden and the other smaller towns.

Table 11.1 *Factors found in this study to be significant in the high rates of mortality for infants, neonates and post-neonates born in Rushden or the other parishes of the Higham Ferrers sub-district from 1879 – 1910*

	All Infants	Rushden Infants	Rushden Neonates	Rushden Post-neonates	Other Infants	Other Neonates	Other Post-neonates
Individual factors							
Twin	■	■	■	■	■	■	■
Illegitimacy	■	■	■	■	■	■	■
Gender - Male - Female	■	■	■ ■	■		■	
Birth Order 3rd 4th	■	■ ■	■ ■	■		■	
Maternal Factors							
Maternal Age - Teens - 40+ [i]	■ ■	■ ■	■	■	■	■	
Ability to notify birth	■	■	■		■	■	
Short birth intervals	■	■	■		■	■	
Family Factors							
Occupation - Shoemaking - Agriculture	■	■	■	■		■	
Migrant status - Stayer - Leaver - Incomer - Transient	■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■	■ ■	■ ■
Environmental Factors							
Winter	■	■	■	■	■	■	■
Infectious diseases [ii]	■	■	■	■			

i) None of the infants of mothers aged 40+ in Rushden died during the neonatal period
ii) The extent to which infectious diseases were responsible for the deaths of infants in Rushden is not known from this study but contemporary reports from the MOH indicate that measles, whooping cough and scarlet fever were responsible for infant death

Source: CVRS and 1881 & 1891

In common with many studies, personal or individual factors such as being one of a twin pair or being illegitimate were seen to impact on the infant experience regardless of

environment (Table 11.1) In contrast to the accepted view that male infants were more vulnerable than their female counterparts, the female neonatal mortality rate in Rushden was also high at 41:1000, indicating that some factor other than gender was influential among the newborns in the town. For males born in Rushden who survived the first month the rate of post-neonatal death was considerably higher than that of their rural counterparts (114:1000 compared to 77:1000 for rural infants). As suggested by Reid (2001) males were often smaller at birth and therefore possibly more vulnerable to infectious diseases. Being born into a large family was also found to be hazardous particularly for 4th born infants, but although this was the case for both urban and rural neonates, if the infants survived the first month then this influence was only seen in Rushden; rural infants having a similar mortality experience regardless of their birth order (Table 11.1). As with gender this may have resulted from the disease environment within Rushden and the increased likelihood of school age children bringing infectious diseases into the home.

Infants born into rapidly built families or those whose mothers were at the age extremes for childbearing were seen to be more vulnerable than those born into smaller, stable conjugal family units. For infants born to teenage mothers in Rushden the chance of neonatal death was however greater than for those born in the other parishes of the sub-district (Table 11.1). This may reflect the support that young mothers in the rural parishes received from their own parents, especially those who were unmarried but further research is needed to confirm this (Chapter 9).

Maternal health has not been open to scrutiny using currently available sources and this study is no exception. However, within this study it was seen that the relationship to the infant of the person notifying the birth was potentially a predictor of neonatal death, with the survival rates of those notified by persons other than the mother being significantly worse. This may have been as a result of maternal ill health or because the infant was unwell and could not be left. In either case the neonatal mortality rate of infants whose fathers registered the birth was very high at 91:1000 compared to that of 8:1000 for mothers. If neither parent was present then the NMR was exceptionally high. The implications of this finding are unclear and further research is needed to verify that this result can be generalised across other populations.

Although this study has not addressed the role that smaller families played in secular decline in infant mortality, the data provides the opportunity to observe micro-level relationships between variables such as those between fertility and infant mortality. Similarly the ability to observe the family into which individuals were born, also has the benefit of being able to measure clustering of deaths, since many of the factors espoused by theorists as being influential in infant mortality would be likely to impact on particular families.

The opportunity to analyse infant deaths within families has also made it possible to focus on one of the main occupational divides in the area: that between shoemakers and non-shoemakers. Although the difference in infant mortality rates between infants from the two different occupational groups was found to be statistically significant, the urban effect was not observed among shoemakers' infants (Table 11.1). All shoemakers' infants suffered similar rates of death wherever they were born in the sub-district and as 78 per cent of Rushden families included in this study were headed by a shoemaker, the occupational influence on infant mortality had a greater impact on the Rushden pattern of mortality than in the other parishes where the percentage employed in shoemaking was less. The influence associated with shoemaking was not uniform however and appeared to impact adversely on infants only during the first month of life. If they survived this period they

were better able to survive the rest of infancy than infants of non-shoemakers. No documented evidence has been found in explanation for the higher neonatal death rate among the infants of shoemakers, although the high rates in Northampton, Wellingborough and Leicester (all shoemaking towns) contribute to the belief that some aspect of the shoemaking process was pernicious. In further support of this view it was found that the highest rates of neonatal mortality were seen during the 1880s when shoemaking reached its zenith, but as production decreased, so too did the neonatal mortality rates. At this point in time it is not known if this finding is replicated in all shoemaking groups elsewhere, but if so then it may have implications for other occupational groups and indicates the need for further research to enhance our understanding of the factors that produced elevated infant mortality in urban areas.

The Leicester study revealed high levels of miscarriage and stillbirths among the shoe workers (Clarke & Mason 1985) and although this has not been analysed within this study, exploration of birth intervals between the two occupational groups (shoemakers and non-shoemakers) may reveal a different pattern of birth intervals. Longer average birth intervals may be indicative of miscarriages; providing further support for the view that some aspect of shoemaking was detrimental to the developing foetus. Similarly shoemaking may have resulted in prematurity leading to short birth intervals that were seen to be a cause of neonatal death and contributed to the high neonatal mortality rates in Rushden (Table 11.1).

The influence of shoemaking may have also permeated other factors identifiable in Table 11.1 such as the impact of migrant status on infant mortality rates. Whilst all transient families experienced high rates of neonatal and post-neonatal mortality, families who stayed in Rushden also experienced higher rates of neonatal mortality compared to the other parishes. Shoemaking families were more likely to stay in the town than in the other parishes because of the opportunities for employment and would therefore have contributed to the higher rates of neonatal mortality within the town.

Conclusion

This study has achieved its aim and provided evidence that demonstrates that the urban effect on infant mortality rates, characteristic of larger urban settings, was present in the Higham Ferrers sub-district, despite the sizes of the parishes involved. Although the situation for infants was not found to be as disastrous as that reported by Thomas (1863), there is little doubt that industrialisation of the shoe industry led to the urbanisation of Rushden and a deterioration of the environment. This in turn brought about an increase in infant mortality. The situation was far from straightforward however and as suggested by Woods (2000) the urban effect was not found to be simply a matter of the environment, but was seen to be a complex interaction of variables at the level of the infant, the family and the community.

Furthermore, this micro-level study has revealed the significance of the vaccination registers to our understanding of infant mortality in the 19th century. Firstly they provide a means of exploring the 'urban effect' from an alternative perspective; that of rural infant mortality. The experiences of the rural infant have been largely used in infant mortality studies as a contrast to urban rates, but a more in-depth study may enhance our understanding of the interaction of the varied influences that underpinned infant death. Secondly as actual dates of birth and death are known, the registers facilitate the exploration of neonatal and perinatal mortality through cohort analysis. For these purposes the vaccination registers are unrivalled.

Appendix 1

Oral Histories on shoemaking in Northamptonshire

Oral histories gathered from inhabitants of Northamptonshire, who were involved in shoemaking at the end of the 19th and beginning of the 20th century, graphically demonstrates the social aspects of shoemaker's lives and experience.

1:1 Shoemaking

" in the houses of the working classes one or more rooms are occupied by machinists and fitters and in these the feminine portion of the community vary the operations of putting on quarters and seaming linings with excursions to the kitchen to see how the dinner is cooking or superintending the mysteries of the family wash "

Boot and Shoe Journal October 23rd 1886 page 14

" very often a lot of those houses had got one long bedroom at the back and some steps on the outside which was built as a workroom for these closing women... "

Mr Horace Smith b.1900 NBC T3/3 Page 15

" You see most of them worked at home in them days and they would have one of the bedrooms as a workroom and they had the bench in the middle and they would sit, place themselves round on little stools. They wouldn't be stools what they'd be was little chairs that'd broke and they'd sawn the legs down and made little stools of them you see. Well at night time I used to go up to my granny's they lived with my grandma and I used to run errand for them... at night time they were working I used to sit and read the newspaper to them... They worked for Manfield's in Northampton, they worked for Smith's Top Boot in Northampton and several firms in Northampton that dishes out work and they used to do a lot of London work too... "

Mr Joseph Marlow NBC T1/5 P 24

"There was women fetched some of the shoes away and stitched them, stitched them round the welts see... Some of the men fetched the shoes out, all the bits, uppers, soles, heels, and like that and it was my job at the start getting all these bits together for these people coming in to fetch the shoes away ... they used to come from long Buckby and Cogenhoe and all over to fetch the shoes ..... some of our best makers made a pair of shoes right through and brought them back finished"

Mr Percy Goodman b.1897 NBC T1/14 page 16

" The real workshops started with Lewis'. It was a smaller place then, altogether different to today ... people used to work in their home. My father had a room as a factory and you'd fetch, well mother did, she fetched the parts and then he'd make them, then she'd take them back, ...they used to book it in them days .... and you'd take this book to the main factory and they'd pay you at the end of the week according to what you'd got written down.... "

Mr Herbert Harrison b. 1887 NBC T1/6 page 18

1:2 Saint Monday

" most of them never used to work on a Monday .. they used to have their apron on, their white apron on, and they would stand on their doorsteps talking and one thing and another. Then they'd go up to the pub dinner time and have a drink and evening time as well and the rest of the week they'd settle in and work right up till ten o clock at night"

Mr Joseph Marlow NBC T1/5 page 29

"I expect you've heard of saint Monday have you? Of course it was a regular thing at that time. I'd had some experiences of it when I was a youngster, but my mother had quite a lot of it and of course the one thing that used to get given a miss was the rent, and it was quite a regular thing in those days so mother used to tell for the bailiffs to come in and get the furniture ....."

Mr Joe Ellis NBC T3/36 page 29

" they used to work all hours bar Monday, they used to go on the booze Mondays .. the pawn shop used to be open on Mondays to take the shirts and everything, suits; there used to be a pawnbroker's nearly on top of every street."

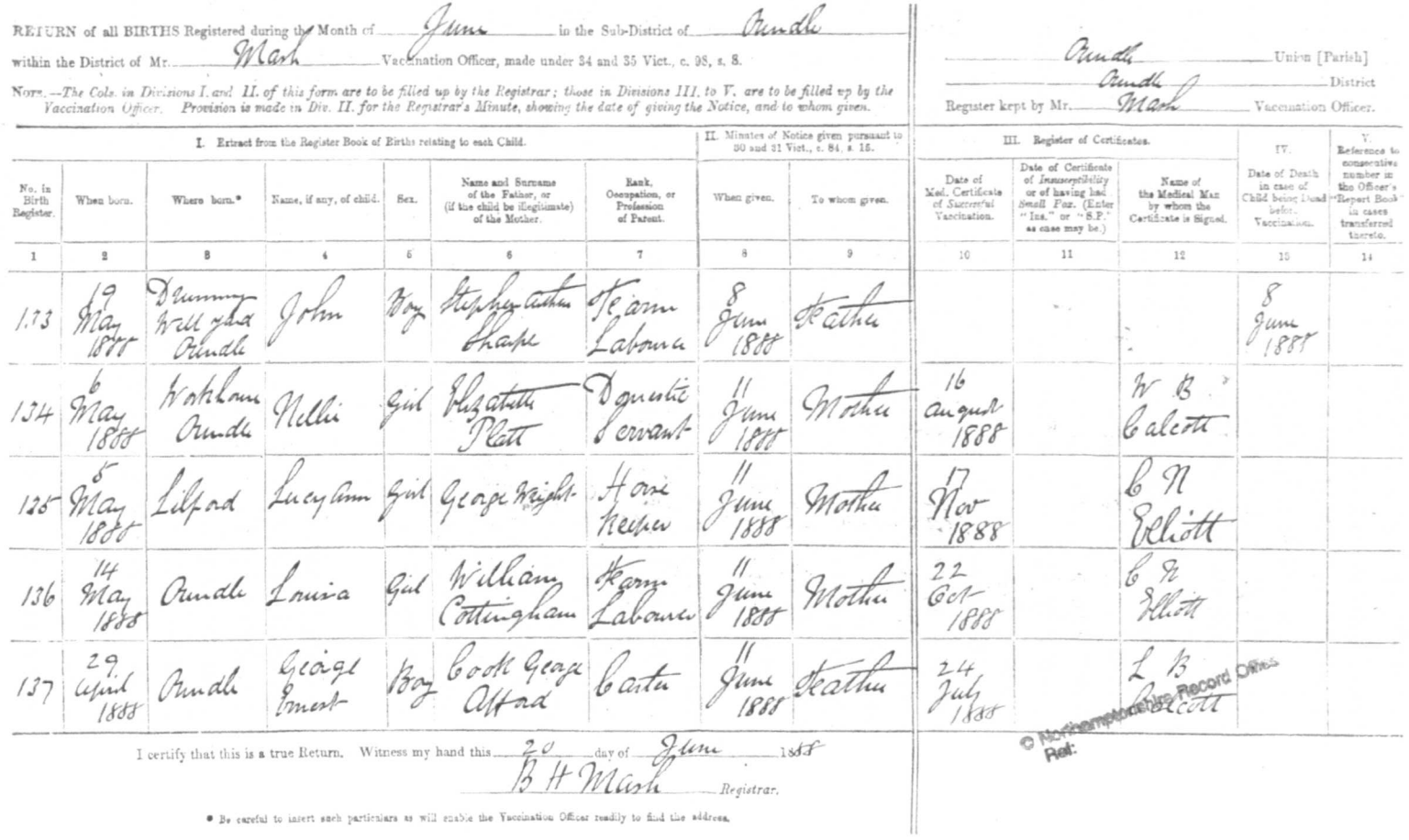
Mr Charlie Marlow NBC T1/3 page 30

"Well that was a regular thing in those days for the handsewn men who worked at home to work in particular on Friday night in order to get some 'shop' ready for Saturday....they'd go round the pawnshops and fetch things out that they'd pawned on the Monday and the possessions that they owned, if they was of any value, they was in the pawnshop from Monday to Saturday, longer than they was in their own possession they was in pawn, that was the life of them ... almost every Monday they'd be out drinking . sometimes later on, until they began to realise they'd got to do something in order to get the money for the weekend"

Mr Joe Ellis NBC T3/36

Source: Kirby, D. Thomas, D. & Turner, L. (1988) *Northampton Remembers: Boot and Shoe* Northampton Borough Council Community Programme

Appendix 2: Copy of page from Vaccination Birth register for Oundle sub-district 1888 [i]



RETURN of all BIRTHS Registered during the Month of June in the Sub-District of Oundle
within the District of Mr. Mark Vaccination Officer, made under 34 and 35 Vict., c. 98, s. 8.

Note.—*The Cols. in Divisions I. and II. of this form are to be filled up by the Registrar; those in Divisions III. to V. are to be filled up by the Vaccination Officer. Provision is made in Div. II. for the Registrar's Minute, showing the date of giving the Notice, and to whom given.*

Oundle Union [Parish]
Oundle District
Register kept by Mr. Mark Vaccination Officer.

I. Extract from the Register Book of Births relating to each Child.							II. Minutes of Notice given pursuant to 30 and 31 Vict., c. 84, s. 15.		III. Register of Certificates.			IV.	V.
No. in Birth Register.	When born.	Where born.*	Name, if any, of child.	Sex.	Name and Surname of the Father, or (if the child be illegitimate) of the Mother.	Rank, Occupation, or Profession of Parent.	When given.	To whom given.	Date of Med. Certificate of Successful Vaccination.	Date of Certificate of Insusceptibility or of having had Small Pox. (Enter "Ins." or "S.P." as case may be.)	Name of the Medical Man by whom the Certificate is Signed.	Date of Death in case of Child being Dead before Vaccination.	Reference to consecutive number in the Officer's "Report Book" in cases transferred thereto.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
133	19 May 1888	Drummy Well yard Oundle	John	Boy	Stephen Arthur Chapman	Agricultural Labourer	8 June 1888	Mother				8 June 1888	
134	6 May 1888	Workhouse Oundle	Nellie	Girl	Elizabeth Platt	Domestic Servant	11 June 1888	Mother	16 August 1888		W B Calcott		
135	5 May 1888	Lilford	Lucy Ann	Girl	George Wright	Horse Keeper	11 June 1888	Mother	17 Nov 1888		C N Elliott		
136	14 May 1888	Oundle	Louisa	Girl	William Cottingham	Farm Labourer	11 June 1888	Mother	22 Oct 1888		C N Elliott		
137	29 April 1888	Oundle	George Ernest	Boy	Cooke George Alfred	Carter	11 June 1888	Mother	24 July 1888		L B Calcott		

I certify that this is a true Return. Witness my hand this 20 day of June 1888
B H Mark Registrar.

* Be careful to insert such particulars as will enable the Vaccination Officer readily to find the address.

i. It was not possible to photocopy a page from the Higham Ferrers vaccination registers and therefore a page from the Oundle registers has been used as an example.

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